

VIRGINIA DIVISION OF MINERAL RESOURCES  
PUBLICATION 125

# COAL, OIL AND GAS, AND INDUSTRIAL AND METALLIC MINERALS INDUSTRIES IN VIRGINIA, 1990

Palmer C. Sweet and Jack E. Nolde



COMMONWEALTH OF VIRGINIA  
DEPARTMENT OF MINES, MINERALS, AND ENERGY  
DIVISION OF MINERAL RESOURCES

Stanley S. Johnson, State Geologist

CHARLOTTESVILLE, VIRGINIA

1992

VIRGINIA DIVISION OF MINERAL RESOURCES  
PUBLICATION 125

# COAL, OIL AND GAS, AND INDUSTRIAL AND METALLIC MINERALS INDUSTRIES IN VIRGINIA, 1990

Palmer C. Sweet and Jack E. Nolde



COMMONWEALTH OF VIRGINIA  
DEPARTMENT OF MINES, MINERALS, AND ENERGY  
DIVISION OF MINERAL RESOURCES

Stanley S. Johnson, State Geologist

CHARLOTTESVILLE, VIRGINIA  
1992

**FRONT COVER:** Quarry site of Miracle Ridge Limestone, Hupman Brothers Excavating, Inc. in Devonian age rocks of the Helderburg Group, Highland County, Virginia (photograph by G.P. Wilkes).

**VIRGINIA DIVISION OF MINERAL RESOURCES  
PUBLICATION 125**

**COAL, OIL AND GAS, AND INDUSTRIAL AND METALLIC  
MINERALS INDUSTRIES IN VIRGINIA, 1990**

**Palmer C. Sweet and Jack E. Nolde**

**COMMONWEALTH OF VIRGINIA  
DEPARTMENT OF MINES, MINERALS, AND ENERGY  
DIVISION OF MINERAL RESOURCES  
Stanley S. Johnson, State Geologist**

**CHARLOTTESVILLE, VIRGINIA  
1992**

DEPARTMENT OF MINES, MINERALS, AND ENERGY  
RICHMOND, VIRGINIA  
O.Gene Dishner, Director

DIVISION OF MINERAL RESOURCES  
CHARLOTTESVILLE, VIRGINIA  
Stanley S. Johnson, State Geologist

STAFF  
Kay T. Ramsey, Executive Secretary

RESEARCH BRANCH  
James F. Conley, Manager

INFORMATION SERVICES AND  
PUBLICATIONS SECTION

Eugene K. Rader, Section Head and Editor  
D. Allen Penick, Jr., Geologist Senior  
Vernon N. Morris, Cartographic Drafter Assistant

ECONOMIC GEOLOGY SECTION

Palmer C. Sweet, Section Head  
William F. Giannini, Geologist Senior  
Jack E. Nolde, Geologist Senior  
Michael L. Upchurch, Geologist Senior

GEOLOGIC MAPPING SECTION

Nick H. Evans, Geologist Senior  
John D. Marr, Jr., Geologist Senior

APPLIED GEOLOGY SECTION

Thomas M. Gathright, II, Section Head  
Elizabeth V. M. Campbell, Geologist Senior  
Karen K. Hostettler, Geologist Senior  
David A. Hubbard, Jr., Geologist Senior  
Roy S. Sites, Geologist Senior  
Gerald P. Wilkes, Geologist Senior

SOUTHWEST SECTION

Alfred R. Taylor, Section Head  
William S. Henika, Geologist Senior  
James A. Lovett, Geologist Senior  
William W. Whitlock, Geologist Senior

SUPPORT BRANCH

Delores J. Green, Office Manager  
Lou A. Carter, Office Services Specialist  
Christopher B. Devan, Librarian  
Daniel W. Johnson, Housekeeping Worker  
Charles B. Marshall, Geologist Technician  
Edwin W. Marshall, Geologist Technician  
Paige S. Roach, Store Operations Supervisor

Copyright 1992  
Commonwealth of Virginia

This publication is based on the best information available to the compilers at the time of its creation. The Virginia Division of Mineral Resources cannot guarantee this publication to be free from errors or inaccuracies, and disclaims responsibility or liability for interpretations or decisions based thereon.

Portions of this publication may be quoted if credit is given to the authors and the Division of Mineral Resources.

## CONTENTS

	Page
Introduction .....	1
Oil and gas .....	1
Introduction .....	1
Permitting activity .....	1
Drilling activity .....	1
Buchanan County .....	2
Dickenson County .....	2
Russell County .....	2
Tazewell County .....	2
Wise County .....	2
Industrial and metallic commodities .....	2
Cement .....	2
Clay materials .....	3
Construction sand and gravel .....	3
Crushed stone .....	3
Dimension stone .....	4
Feldspar .....	4
Gem stones .....	4
Gypsum .....	5
Industrial sand .....	5
Iron-oxide pigments .....	5
Kyanite .....	5
Lime .....	5
Lithium .....	6
Magnetite .....	6
Manganese .....	6
Mica .....	6
Ornamental aggregate .....	6
Perlite .....	7
Phosphate rock .....	7
Sulfur .....	7
Vermiculite .....	7

## ILLUSTRATIONS

### Figure

1. Quarrying operation in the Liberty Hall Formation for crushed stone, Charles W. Barger and Son Construction Co., Inc., Lexington, Virginia. ....	3
2. Roadstone, concrete aggregate, asphalt stone and manufactured sand produced from this quarry of ACCO Stone, Salem Stone Company, Blacksburg, Virginia. ....	3
3. Diabase, being crushed in primary crusher, Vulcan Materials Company, Manassas, Virginia. ....	4
4. New Market Limestone calcined in coal-fired rotary kiln at Chemstone Corporation, Strasburg, Virginia. ....	6
5. Plant of Asheville Mica Company - Mica Company of Canada in the City of Newport News, Virginia. ....	6
6. Entranceway to refinery of Amoco Oil Company, Yorktown, Virginia. ....	7

## TABLES

1. Mineral Production in Virginia, 1990. ....	8
2. Summary of Metal/Nonmetal Mining and Quarrying 1990. ....	8
3. Summary of Metal/Nonmetal mining and quarrying, by county/city, 1990. ....	9
4. Summary of coal mine production in Virginia, 1990. ....	10
5. Summary of coal mining in Virginia, by coal bed, 1990. ....	11
6. Summary of coal employment in Virginia, 1990. ....	11
7. Oil production by company and field, 1990. ....	12

	<b>Page</b>
8. Gas production by company in each county, 1990. ....	13
9. Well completions summary, 1990. ....	14
10. Footage drilled for gas, 1990. ....	14
11. Wells drilled in Virginia, 1990. ....	15

# COAL, OIL AND GAS, INDUSTRIAL AND METALLIC MINERALS INDUSTRIES IN VIRGINIA, 1990

Palmer C. Sweet and Jack E. Nolde

## INTRODUCTION

The total value of mineral production in Virginia in 1990 was 2.34-billion dollars (Table 1). About 1.79-billion dollars resulted from coal sales, a 10 percent increase in value above the 1989 figure of 1.62-billion dollars. About 33-million dollars resulted from the sale of petroleum and natural gas, with the remaining 512-million dollars from production of industrial rocks and minerals (Table 2 and 3). This represents a decrease of about 8-million dollars for 1990, when compared with 1989 statistics. Lime production was up 6 percent and coal production was up 6 percent, when compared with 1989 figures. The value of coal increased almost 170-million dollars. On the decline, due mainly to the economy, were petroleum, 31 percent; natural gas, down 18 percent; clay, down 24 percent and crushed stone, down 7 percent from 1989 figures.

The number of producers, amount of production, and number of processing plants remained stable during the year for cement, feldspar, gem stones, gypsum, industrial sand, iron-oxide pigments, kyanite, ornamental aggregate, sand and gravel, and vermiculite.

Virginia led the nation in the production of kyanite, was the only producer of feldspar, marketed as "Virginia aplite", and was one of three states mining vermiculite. Several mineral commodities - lithium carbonate, magnetite, manganese, mica, perlite, and phosphate rock were imported for processing.

## COAL<sup>1</sup>

About 46.5 million tons (Table 1) of bituminous coal were produced from the southwest coalfields in Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise Counties from 487 surface and underground mines. Tables 4 through 6 provide production data by county and coal bed, mines and mining methods, and employment statistics. The top three coal producing beds from the southwest field are the Pocahontas No. 3 coal bed, Dorchester coal bed and the Jawbone coal bed. More than 41 percent of the production was from these 3 coal beds. Included in this production total are 1291 short tons of semi-anthracite coal produced from 2 additional surface mines in the Valley Coal Field, Montgomery County.

Coal from Virginia is used for metallurgical purposes, electrical power generation (steam coal), industrial purposes, and residential heating. A large percentage of Virginia coal is contracted for export to overseas markets. The

coal is exported through the ports in the Hampton Roads area in Virginia and at Wilmington in North Carolina.

## OIL AND GAS<sup>2</sup>

### INTRODUCTION

Crude oil and gas condensate production in Virginia totaled 14,676 barrels in 1990, a 18 percent decrease from the 1989 production of 17,935 barrels. Production was by 9 companies from 42 wells in four fields (Table 7), the Ben Hur-Fleenortown, Knox, and Rose Hill in Lee County (crude oil) and the Roaring Fork in western Wise County (gas condensate). Almost all of Virginia oil comes from the Ordovician Trenton Limestone and the gas condensate comes from the Mississippian Greenbrier Limestone ("Big Lime").

Natural gas production decreased 18 percent, from 17,935,376 Mcf in 1989 to 14,773,584 Mcf in 1990. Production was from 819 wells (Table 8). Coalbed methane wells produced 818,869 Mcf from 39 wells; 5.5 percent of the total production in the state. The average price paid to Virginia's natural gas producers in 1990 was 2.22 dollars per Mcf.

### PERMITTING ACTIVITY

Overall permitting activity continued to increase. The Department of Mines, Minerals, and Energy, Division of Gas and Oil issued 269 permits in 1990. Of these, 194 permits were issued to drill new wells, 73 permits were for pipelines, and 2 for modifications.

### DRILLING ACTIVITY

In 1990, a total of 121 wells were drilled in Virginia (Table 9). This represents almost a 200 percent increase over the 40 wells drilled during 1989. Of the 121 wells drilled, 66 were for coalbed methane. Total footage drilled was 405,511 feet (Table 10), a 126 percent increase over the total 178,993 feet drilled in 1989. Of the 1990 total footage, 252,069 feet were for conventional gas wells and 153,442 feet were coalbed methane wells. In 1990, the average depth of conventional gas wells was 4800 feet and coalbed methane wells 2280 feet. The county with most active natural gas and coalbed methane well drilling was Dickenson with 59 wells, followed by Buchanan with 48, Wise with 11, Russell with

<sup>1</sup> Information supplied by Division of Mines, 219 Wood Avenue, Big Stone Gap, Virginia 24219.

<sup>2</sup> Information supplied by Division of Gas and Oil, P. O. Box 1416, Abingdon, Virginia 24210.



2, and Tazewell with one. Table 11 provides data on wells drilled in 1990.

#### BUCHANAN COUNTY

Conventional wells: Twenty-two development wells were completed with a total footage of 107,473 feet. Production was attained from the Chattanooga Shale, "Berea sand", Price Formation ("Weir sand"), and the Greenbrier Limestone.

Ashland Exploration drilled four development wells in the Keen Mountain field with a total footage of 19,607 feet. Wells produce from the "Berea sand". Cabot Oil and Gas drilled two development wells with a total of 10,882 feet in the Glick field. Production is from the "Berea sand" and Greenbrier Limestone. CDG Development drilled two successful development wells in the Breaks-Haysi field producing from the "Berea sand". Columbia Natural Resources drilled a total of 11,192 feet for two development wells in the Breaks-Haysi field producing from the Chattanooga Shale and "Berea sand". Edwards & Harding Petroleum Company successfully completed 12 development wells with a total footage of 61,201 feet. Ten wells produce from the "Berea sand" and one well each from comingling of gas from the "Berea sand"-Price Formation and "Berea sand"-Greenbrier Limestone.

Coalbed methane wells: Twenty-six development wells were drilled by OXY USA in the Keen Mountain field with a total footage of 53,021. These wells are scheduled for completion during the Fall of 1991. The targets for coalbed methane are the Early Pennsylvanian Pocahontas and Lee Formations.

#### DICKENSON COUNTY

Conventional wells: Sixteen development wells were completed with a total footage of 71,332 feet. Two additional development wells with a total footage of 4788 feet were plugged and abandoned in the Bluestone and Hinton Formations. Production was attained from the Chattanooga Shale, "Berea sand", Price Formation, and the Greenbrier Limestone.

Columbia Natural Resources completed one development well with a total depth of 5763 feet and attained production from the Chattanooga Shale. Edwards & Harding Petroleum Company successfully completed four development wells in the Breaks-Haysi and Nora fields for a total depth of 17,894 feet and two exploratory wells with a total footage of 6719 feet. EREX, Inc. completed 13 development wells with two of the wells being plugged and abandoned. The total footage drilled was 52,463 feet. Three exploratory wells were successfully completed with a total footage of 12,125 feet.

Coalbed methane wells: EREX, Inc. completed 38 coalbed methane wells in the Nora field. Total footage drilled was 90,218 feet. Of the 38 wells completed 33 were development wells with a total footage of 77,914 feet. The targets for coalbed methane are the Early Pennsylvanian Pocahontas and Lee Formations.

#### RUSSELL COUNTY

Coalbed methane wells: EREX, Inc. successfully completed two coalbed methane wells with a total footage of 4694. The targets for coalbed methane are the Early Pennsylvanian Pocahontas and Lee Formations.

#### TAZEWELL COUNTY

Conventional wells: One development well was completed by CNG Development Company with a total depth of 4975 feet. The well was drilled into the Devonian portion of the Chattanooga Shale and was subsequently completed as a producer in the Price Formation.

#### WISE COUNTY

Conventional wells: Eight development wells were completed in Wise County during 1990 with a total footage of 46,088 feet. Production was attained from the Chattanooga Shale, "Berea sand", Price Formation, and the Greenbrier Limestone. ANR Production Company completed 7 of these development wells amounting to 40,765 feet or 88 percent of the development footage. EREX, Inc. completed a development well to a depth of 5323 feet. Formation at total depth in these wells was the Devonian Chattanooga Shale. ANR Production Company completed one exploratory well in Wise County during 1990. The well was drilled to a depth of 5288 feet and into the Silurian Rose Hill Formation.

Coalbed methane wells: EREX, Inc. completed two coalbed methane wells in Wise County during 1990. Total footage drilled was 5009. The wells were drilled into the Mississippian Bluestone Formation. The targets for coalbed methane are the Early Pennsylvanian Pocahontas and Lee Formations.

### INDUSTRIAL AND METALLIC COMMODITIES

#### CEMENT

Three companies, one each in Warren and Botetourt Counties and in the City of Chesapeake, produce cement in Virginia. Riverton Corporation in Warren County produces masonry cement at their plant north of Front Royal. There, crushed limestone (Edinburg Formation) is calcined, hydrated, and mixed with portland cement from out-of-state sources. Sales are made to building supply dealers in Virginia and surrounding states. Roanoke Cement Company operates a plant in western Botetourt County. The facility manufactures portland cement from locally mined limestone and shale and iron scale from Roanoke Electric Steel Company. Burned calcium and iron aluminate clinker is manufactured in five coal-fired kilns and ground into cement. Three-fourths of the cement is sold to ready-mix companies. LaFarge Calcium Aluminate, Inc. operates a cement manufacturing plant in the City of Chesapeake. Cement clinker is imported, ground, and made into six types

of calcium aluminate cement at the facility. The advantages of this cement include rapid hardening, resistance to wear and corrosion and the capacity to be used under a wide range of temperatures.

### CLAY MATERIALS

Residual and transported clay, weathered phyllite and schist, and shale are used as raw material to produce almost one-half billion bricks in Virginia annually when all the plants are operating at full capacity. More than 790,000 metric tons of clay (exclusive of fuller's earth) were produced in Virginia in 1990. The clay-material industry in the western part of the state mines Paleozoic-age shale, with the primary end product being face brick. Face-brick producers in the central-to-eastern part of Virginia mine Triassic-age shale and clay residuum in Orange and Prince William Counties and Precambrian-age schist and residual and transported clay in Amherst, Brunswick, Chesterfield, Greensville, and Henrico Counties.

Lightweight aggregate is produced in Botetourt, Buckingham, and Pittsylvania Counties. Weblite Corporation in Botetourt County mines shale from the Rome Formation to produce lightweight aggregate by the sintering process, using semi-anthracite waste coal from Montgomery County to fire the kilns. They utilize about 100 tons of coal per day to yield a lightweight-product having a weight as low as 31 lb/ft<sup>3</sup> for particle sizes of 5/16 to 3/4 inches. Solite Corporation in northern Buckingham County uses the Arvonite Slate to produce lightweight aggregate. Triassic-age shale is used by Virginia Solite Company southwest of Danville, Pittsylvania County, to obtain a similar product.

Bennett Mineral Company in the Walkerton area of King and Queen County in eastern Virginia mines and processes montmorillonite (fuller's earth) clay to produce an industrial and sanitary absorbent. The facility uses wood wastes as a plant fuel to dry the clay in a rotary kiln.

### CONSTRUCTION SAND AND GRAVEL

Construction sand and gravel producers accounted for 12.7 million tons of material produced in 1990 at a value of almost 53 million dollars. Sand and gravel is extracted from the terraces and dredged from the rivers of the major drainages in central and eastern Virginia. Large tonnages of construction sand and gravel, from southeast of Fredericksburg, are shipped by rail into the northern Virginia-Washington, D.C. market area. A large portion of the production by Sadler Materials Corporation and Tarmac Virginia, Inc. near Richmond is barged down the James River to the Norfolk area. Shipments are also made by rail and truck to the western part of the state. Construction sand (concrete and masonry) is also produced from operations that crush and process sandstone. Sayers Sand Company in Smyth County produces construction sand from the Erwin Formation.

### CRUSHED STONE

Crushed limestone, dolomite, sandstone, quartzite, granite, gneiss, diabase, basalt, greenstone, amphibolite, slate, "Virginia aplite," and marble, valued at more than 320 million dollars was produced in Virginia in 1990. Virginia was the fifth leading producer of crushed stone behind Pennsylvania, Texas, Florida and Illinois.

Limestone, dolomite, shale, and sandstone and quartzite mineral producers are located in the Valley and Ridge and Plateau provinces in the western portion of the state (Figure 1). Principal end uses were for roadstone, concrete aggregate, asphalt stone, and agricultural application (Figure 2). Mine safety dust (335,000 short tons in 1980) is produced in southwest Virginia from limestone. More recent figures on safety dust are combined with those for acid-water treatment material in stone production. Safety dust is used in coal mines to prevent explosions. The dust should contain less than 5 percent SiO<sub>2</sub> and 100 percent should pass 20 mesh, with 70 percent passing minus 200 mesh. Finely-ground dolomite and limestone is also marketed by several operations for use as a filler material.



Figure 1. Quarrying operation in the Liberty Hall Formation for crushed stone, Charles W. Barger and Son Construction Co., Inc., Lexington, Virginia



Figure 2. Roadstone, concrete aggregate, asphalt stone and manufactured sand produced from this quarry of ACCO Stone, Salem Stone Company, Blacksburg, Virginia

Shale is excavated in Frederick and Rockingham Counties for use as local roadstone and fill material. Sandstone and quartzite is quarried in Carroll, Culpeper, Pittsylvania, Rockbridge and Wythe Counties for the production of

of calcium aluminate cement at the facility. The advantages of this cement include rapid hardening, resistance to wear and corrosion and the capacity to be used under a wide range of temperatures.

### CLAY MATERIALS

Residual and transported clay, weathered phyllite and schist, and shale are used as raw material to produce almost one-half billion bricks in Virginia annually when all the plants are operating at full capacity. More than 790,000 metric tons of clay (exclusive of fuller's earth) were produced in Virginia in 1990. The clay-material industry in the western part of the state mines Paleozoic-age shale, with the primary end product being face brick. Face-brick producers in the central-to-eastern part of Virginia mine Triassic-age shale and clay residuum in Orange and Prince William Counties and Precambrian-age schist and residual and transported clay in Amherst, Brunswick, Chesterfield, Greensville, and Henrico Counties.

Lightweight aggregate is produced in Botetourt, Buckingham, and Pittsylvania Counties. Weblite Corporation in Botetourt County mines shale from the Rome Formation to produce lightweight aggregate by the sintering process, using semi-anthracite waste coal from Montgomery County to fire the kilns. They utilize about 100 tons of coal per day to yield a lightweight-product having a weight as low as 31 lb/ft<sup>3</sup> for particle sizes of 5/16 to 3/4 inches. Solite Corporation in northern Buckingham County uses the Arvonian Slate to produce lightweight aggregate. Triassic-age shale is used by Virginia Solite Company southwest of Danville, Pittsylvania County, to obtain a similar product.

Bennett Mineral Company in the Walkerton area of King and Queen County in eastern Virginia mines and processes montmorillonite (fuller's earth) clay to produce an industrial and sanitary absorbent. The facility uses wood wastes as a plant fuel to dry the clay in a rotary kiln.

### CONSTRUCTION SAND AND GRAVEL

Construction sand and gravel producers accounted for 12.7 million tons of material produced in 1990 at a value of almost 53 million dollars. Sand and gravel is extracted from the terraces and dredged from the rivers of the major drainages in central and eastern Virginia. Large tonnages of construction sand and gravel, from southeast of Fredericksburg, are shipped by rail into the northern Virginia-Washington, D.C. market area. A large portion of the production by Sadler Materials Corporation and Tarmac Virginia, Inc. near Richmond is barged down the James River to the Norfolk area. Shipments are also made by rail and truck to the western part of the state. Construction sand (concrete and masonry) is also produced from operations that crush and process sandstone. Sayers Sand Company in Smyth County produces construction sand from the Erwin Formation.

### CRUSHED STONE

Crushed limestone, dolomite, sandstone, quartzite, granite, gneiss, diabase, basalt, greenstone, amphibolite, slate, "Virginia aplite," and marble, valued at more than 320 million dollars was produced in Virginia in 1990. Virginia was the fifth leading producer of crushed stone behind Pennsylvania, Texas, Florida and Illinois.

Limestone, dolomite, shale, and sandstone and quartzite mineral producers are located in the Valley and Ridge and Plateau provinces in the western portion of the state (Figure 1). Principal end uses were for roadstone, concrete aggregate, asphalt stone, and agricultural application (Figure 2). Mine safety dust (335,000 short tons in 1980) is produced in southwest Virginia from limestone. More recent figures on safety dust are combined with those for acid-water treatment material in stone production. Safety dust is used in coal mines to prevent explosions. The dust should contain less than 5 percent SiO<sub>2</sub> and 100 percent should pass 20 mesh, with 70 percent passing minus 200 mesh. Finely-ground dolomite and limestone is also marketed by several operations for use as a filler material.



Figure 1. Quarrying operation in the Liberty Hall Formation for crushed stone, Charles W. Barger and Son Construction Co., Inc., Lexington, Virginia



Figure 2. Roadstone, concrete aggregate, asphalt stone and manufactured sand produced from this quarry of ACCO Stone, Salem Stone Company, Blacksburg, Virginia

Shale is excavated in Frederick and Rockingham Counties for use as local roadstone and fill material. Sandstone and quartzite is quarried in Carroll, Culpeper, Pittsylvania, Rockbridge and Wythe Counties for the production of

roadstone, concrete aggregate, asphalt stone, and manufactured fine aggregate.

Granite, gneiss, diabase, basalt, amphibolite, slate, and marble are quarried in the central portion of Virginia (Figure 3). Major end uses are for roadstone, asphalt stone, and concrete aggregate. Waste slate is crushed near Arvonnia in Buckingham County by Solite Corporation. Solite uses the slate primarily for lightweight aggregate production. Production of crushed slate, as a by-product of dimension slate operations, increased as a result of local highway construction. Appomattox Lime Company, Inc., mines a marble (Mt. Athos Formation) near Oakville in Appomattox County for agricultural lime.

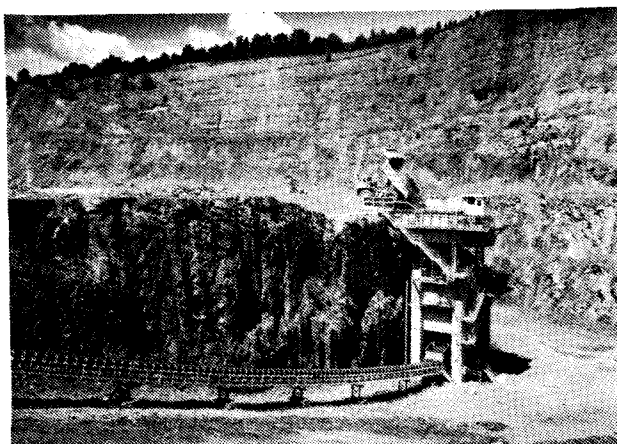


Figure 3. Diabase, being crushed in primary crusher, Vulcan Materials Company, Manassas, Virginia.

Fines produced at granite quarries in the southern part of Virginia have been trucked to central Virginia for low-grade fertilizer (D. Via, personal communication). Chemical analyses for granitic materials from Brunswick and Nottoway Counties in the southern Piedmont province indicate  $K_2O$  (potash) percentages higher than 10 percent. Potash silicates (orthoclase feldspar) common in igneous and metamorphic rocks release potash minerals upon weathering.

#### DIMENSION STONE

Slate, diabase, quartzite, and soapstone were quarried in the Piedmont Province for dimension stone in 1990. Slate was the leading stone type quarried, in terms of cubic feet and value; LeSueur-Richmond Slate Corporation mines slate from two quarries in the Arvonnia area of Buckingham County. Arvonnia slate production dates from the late 1700s when slate was quarried for use as roofing tiles for the State Capitol in Richmond. Slate producers supply the building trade with a variety of products ranging from material for exterior applications, such as roofing tile and flooring, to interior uses such as flooring, hearths and sills. Diabase for use as monument stone is produced by Virginia Granite Company in southern Culpeper County. Quartzite used as flagging material was extracted from two quarries, Carter Stone Company in Campbell County, south of Lynchburg,

and Mower Quarries in Fauquier County, north of Warrenton. The New Alberene Stone Company, Inc. is quarrying soapstone from the quarry at Alberene and opened a new quarry site in late 1989. Their products include soapstone fireplaces, woodstoves, cooking ware, and other products of solid soapstone.

#### FELDSPAR

The Feldspar Corporation operates a mine and plant near Montpelier in Hanover County in east-central Virginia and produces a material marketed as "Virginia aplite," which is sold to the glass industry. The "aplite" improves the workability of the molten glass and imparts a chemical stability to the finished glassware. Feldspar is mined from medium- to coarse-grained meta-anorthosite by open pit methods. The rock is trucked to the plant adjacent to the mine for crushing, grinding, classifying, and drying. After this processing, the aplite is stored in silos. Clay minerals are removed by gravity concentration. The heavy minerals in the feldspar (ilmenite, rutile, and sphene) are removed by electrostatic processing and magnets. These minerals were stockpiled until the early 1980s but are currently being placed in settling ponds. The processed feldspar is shipped by truck and rail to markets in New Jersey, Pennsylvania, Ohio, and Indiana.

Feldspar in Amherst County is marketed as aggregate by the W.W. Boxley Company, Blue Ridge Stone Corporation, Piney River Quarry. The fines that result from the crushing of feldspar are stockpiled. Feldspar has been mined from several pegmatite bodies in the Piedmont province in the past, including those in Amelia and Bedford Counties.

Clay and silt, with a high percentage of kaolinite and mica, has accumulated in settling ponds at The Feldspar Corporation in Hanover County. This "tailings" waste material was evaluated in the mid-1960s and was found to be suitable for use in face brick and drain tile; the material fires dark brown to gray. Fines may have potential as a flux material for the brick industry. About 75,000 to 100,000 tons of this material are added to settling ponds per year.

#### GEM STONES

Mines and collectors in Virginia generated an estimated value of \$10,000 of natural gem stones in 1990. The Morefield pegmatite in Amelia County is open to the public for collecting on a fee basis by Piedmont Mining Company; the company also mines and sells "hand picked" mica. Blue-green amazonstone, beryl, topaz, tantalite, tourmaline, and zircon are some of the minerals found in the pegmatite. Stone Cross Mountain operates a fee basis collecting operation north of Stuart, Patrick County in southern Virginia. Staurolite crystals (fairystone crosses) are the main interest of collectors at this site and for a fee you can sift through and wash a bucket of material.



roadstone, concrete aggregate, asphalt stone, and manufactured fine aggregate.

Granite, gneiss, diabase, basalt, amphibolite, slate, and marble are quarried in the central portion of Virginia (Figure 3). Major end uses are for roadstone, asphalt stone, and concrete aggregate. Waste slate is crushed near Arvon in Buckingham County by Solite Corporation. Solite uses the slate primarily for lightweight aggregate production. Production of crushed slate, as a by-product of dimension slate operations, increased as a result of local highway construction. Appomattox Lime Company, Inc., mines a marble (Mt. Athos Formation) near Oakville in Appomattox County for agricultural lime.

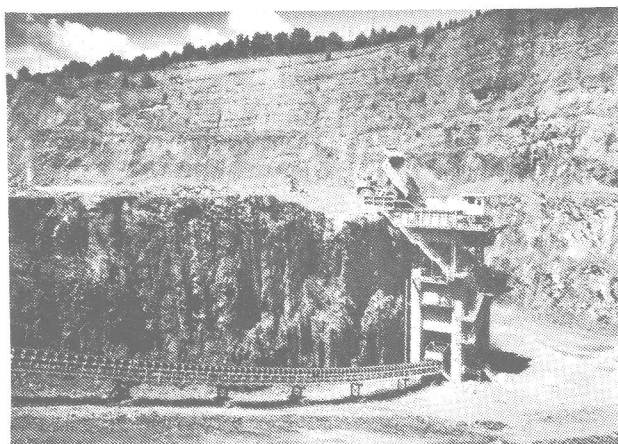


Figure 3. Diabase, being crushed in primary crusher, Vulcan Materials Company, Manassas, Virginia.

Fines produced at granite quarries in the southern part of Virginia have been trucked to central Virginia for low-grade fertilizer (D. Via, personal communication). Chemical analyses for granitic materials from Brunswick and Nottoway Counties in the southern Piedmont province indicate  $K_2O$  (potash) percentages higher than 10 percent. Potash silicates (orthoclase feldspar) common in igneous and metamorphic rocks release potash minerals upon weathering.

#### DIMENSION STONE

Slate, diabase, quartzite, and soapstone were quarried in the Piedmont Province for dimension stone in 1990. Slate was the leading stone type quarried, in terms of cubic feet and value; LeSueur-Richmond Slate Corporation mines slate from two quarries in the Arvon area of Buckingham County. Arvon slate production dates from the late 1700s when slate was quarried for use as roofing tiles for the State Capitol in Richmond. Slate producers supply the building trade with a variety of products ranging from material for exterior applications, such as roofing tile and flooring, to interior uses such as flooring, hearths and sills. Diabase for use as monument stone is produced by Virginia Granite Company in southern Culpeper County. Quartzite used as flagging material was extracted from two quarries, Carter Stone Company in Campbell County, south of Lynchburg,

and Mower Quarries in Fauquier County, north of Warrenton. The New Alberene Stone Company, Inc. is quarrying soapstone from the quarry at Alberene and opened a new quarry site in late 1989. Their products include soapstone fireplaces, woodstoves, cooking ware, and other products of solid soapstone.

#### FELDSPAR

The Feldspar Corporation operates a mine and plant near Montpelier in Hanover County in east-central Virginia and produces a material marketed as "Virginia aplite," which is sold to the glass industry. The "aplite" improves the workability of the molten glass and imparts a chemical stability to the finished glassware. Feldspar is mined from medium- to coarse-grained meta-anorthosite by open pit methods. The rock is trucked to the plant adjacent to the mine for crushing, grinding, classifying, and drying. After this processing, the aplite is stored in silos. Clay minerals are removed by gravity concentration. The heavy minerals in the feldspar (ilmenite, rutile, and sphene) are removed by electrostatic processing and magnets. These minerals were stockpiled until the early 1980s but are currently being placed in settling ponds. The processed feldspar is shipped by truck and rail to markets in New Jersey, Pennsylvania, Ohio, and Indiana.

Feldspar in Amherst County is marketed as aggregate by the W.W. Boxley Company, Blue Ridge Stone Corporation, Piney River Quarry. The fines that result from the crushing of feldspar are stockpiled. Feldspar has been mined from several pegmatite bodies in the Piedmont province in the past, including those in Amelia and Bedford Counties.

Clay and silt, with a high percentage of kaolinite and mica, has accumulated in settling ponds at The Feldspar Corporation in Hanover County. This "tailings" waste material was evaluated in the mid-1960s and was found to be suitable for use in face brick and drain tile; the material fires dark brown to gray. Fines may have potential as a flux material for the brick industry. About 75,000 to 100,000 tons of this material are added to settling ponds per year.

#### GEM STONES

Mines and collectors in Virginia generated an estimated value of \$10,000 of natural gem stones in 1990. The Morefield pegmatite in Amelia County is open to the public for collecting on a fee basis by Piedmont Mining Company; the company also mines and sells "hand picked" mica. Blue-green amazonstone, beryl, topaz, tantalite, tourmaline, and zircon are some of the minerals found in the pegmatite. Stone Cross Mountain operates a fee basis collecting operation north of Stuart, Patrick County in southern Virginia. Staurolite crystals (fairystone crosses) are the main interest of collectors at this site and for a fee you can sift through and wash a bucket of material.

## GYPSUM

U.S. Gypsum Company operates a mine and plant in the southwestern part of the state and a processing plant in Norfolk. The underground mine is located at Locust Cove, Smyth County. The Locust Cove mine is a slope-entry, multilevel operation. Isolated masses of gypsum in the Maccrady Formation are mined by a modified stoping system. The gypsum is trucked to their processing plant located at Plasterco, near Saltville, in adjacent Washington County. The Plasterco plant manufactures wallboard that is used in construction.

The Norfolk plant processes crude gypsum from Nova Scotia to produce wallboard and other gypsum-based products. The plant also produces a fertilizer (land plaster) for the peanut industry. The Norfolk facility receives a few shipments of anhydrite from Nova Scotia for sale to cement manufacturers. The anhydrite is used as a source of sulfur in producing cement clinker.

## INDUSTRIAL SAND

Traction sand is produced in Dickenson County by Howard L. Daniels Sand Company. Glass sand is produced by Unimin Corporation near Gore in Frederick County from the Ridgeley Sandstone of Devonian-age. CED Process Minerals Inc., in Frederick County, recrystallizes purchased sand in a rotary kiln to produce cristobalite, which is marketed as a fine grit.

## IRON-OXIDE PIGMENTS

Virginia is one of four states that produce natural iron-oxide pigments. Hoover Color Corporation, located in Hiwassee, Pulaski County, produces ocher, umber, and sienna. The company is the only operation in the United States producing sienna. Raw materials are mined by open pit methods from deposits near the contact of the Erwin Formation with the overlying Shady Dolomite. Deposits, which may be associated with Cambrian age gossans, are concentrated in pockets with insoluble clay and iron oxide. Some iron is also concentrated by precipitation from groundwater. The raw material is trucked to the company plant at Hiwassee where it is pulverized, dried, ground, air separated, blended, and packaged prior to shipping. The finished product is used as a coloring agent in a variety of products. The largest market continues to be for paint; art supplies (crayola crayons, chalk, water colors) as well as building products (colored cinderblock, brick, etc.) are additional markets. Material is shipped throughout the United States and to Canada and Mexico. Virginia Earth Pigments Company mines a small quantity of iron oxide from the Brubaker #1 mine in southeastern Wythe County. The majority of this material is sold to Hoover Color Corporation.

## KYANITE

Kyanite, an aluminum silicate, was first produced in

Prince Edward County in the 1920s. Since September, 1986, Virginia is the only state producing kyanite. The majority of the world's kyanite is produced by Kyanite Mining Corporation from their deposit in Buckingham County. The company produces a concentrate grade with a maximum of 61.8 percent alumina and a minimum iron content of 0.16 percent. Calcined kyanite is converted to mullite at temperatures greater than 3000 degrees Fahrenheit. The mullite is a super-duty refractory with a pyrometric cone equivalent of 36 to 37. Products, which are sold in 35, 48, 100, 200, and 325 mesh sizes, are used in the refractory, ceramic, glass, metallurgical, and foundry industries. Mullite aids ceramics and glass to resist cracking, warping, slagging, and deforming from high temperatures.

Kyanite Mining Corporation operates two surface mines and processing plants in central Buckingham County, one at Willis Mountain and one at East Ridge. Kyanite-bearing quartzite is quarried from open pits, run through primary crushers, a log washer to remove clay, and onto the classifiers to remove kyanite. The material then passes through a rod mill which reduces it to a minus 35-mesh size, and then through froth flotation cells where the kyanite is skimmed off. The kyanite is dewatered and dried; the high temperature of the drier converts the sulfide minerals that are present in the quartzite to oxides. Pyrite is converted to ferrous iron oxide ( $\text{Fe}_2\text{O}_3$ ) or magnetite, which is then removed by magnetic separators and stockpiled.

The Willis Mountain plant processes the raw kyanite which is then trucked to the East Ridge facility for calcining. Mullite is ground and bagged at the company's Dillwyn Plant and raw kyanite is ground and bagged at Willis Mountain.

Approximately 40 percent of the production is shipped through the ports in the Hampton Roads area to customers worldwide. The company also markets a by-product sand obtained from the processing of kyanite. It is sold for golf course, masonry, and concrete sand and for other applications.

## LIME

Virginia's lime industry is located in Frederick, Giles, Shenandoah, and Warren Counties. Production from six companies in 1990 was 858,000 short tons valued at almost 33-million dollars. In northwestern Virginia, two companies, W. S. Frey Company, Inc. and Chemstone Corporation quarry and calcine the high-calcium New Market Limestone (Figure 4); Riverton Corporation in Warren County quarries and calcines limestone from the Edinburg Formation. Shenvalley Lime Corporation in Stephens City, Frederick County purchases quicklime and produces a hydrated lime. Two companies in western Giles County (APG Lime Corporation and Virginia Lime Company) operate underground mines in the Five Oaks Limestone. Both companies calcine the Five Oaks Limestone in rotary kilns. Principal sales are to the paper and steel industries.

The paper industry uses lime for regeneration of sodium hydroxide and for the neutralization of sulfate water. Lime is used in iron furnaces to remove impurities and to purify water. During the last few years, lime has been used to

neutralize acid mine water. It is used also for mason's lime, sewage treatment, and agricultural purposes. One of the more important uses of lime in the 1990s will be to abate the  $\text{SO}_2$  and  $\text{NO}_x$  emissions from coal fired boilers.

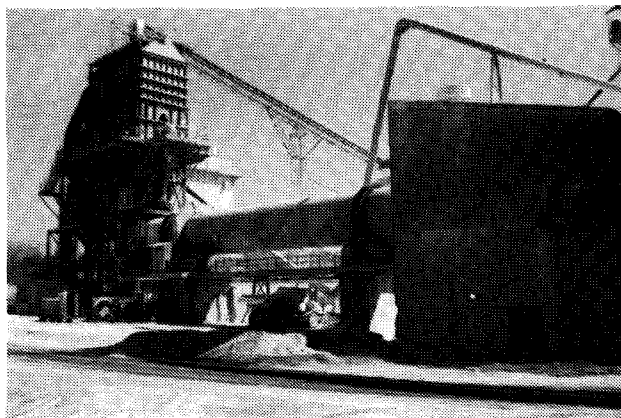


Figure 4. New Market Limestone calcined in coal-fired rotary kiln at Chemstone Corporation, Strasburg, Virginia.

### LITHIUM

Cyprus Foote Mineral Company processes lithium carbonate from brines in Nevada with calcium hydroxide from various sources to produce lithium hydroxide at their Sunbright plant in Scott County. Lithium hydroxide is used in multipurpose grease. In the past, limestone from an underground mine at the Sunbright site was utilized in the manufacturing process and a calcium carbonate precipitate was formed as a waste product. This material remains on the site and may have a potential use. The approximate analysis of the material is 43 to 50 percent  $\text{CaCO}_3$ , 3 to 6 percent  $\text{Ca(OH)}_2$ , and 40 to 48 percent  $\text{H}_2\text{O}$ .

### MAGNETITE

Reiss Viking Corporation in Tazewell County processes out-of-state magnetite for use in cleaning coal. The magnetite is obtained from New York, with minor amounts being imported. Magnetite is dried, ground in a ball mill, classified, and graded by percentage of material passing a 325-mesh sieve; grades produced are 40, 70, 90, 96.5, and 99. The magnetite is marketed in Virginia and Kentucky. In the coal cleaning process, magnetite is mixed with water to form a heavy-media slurry into which raw coal is fed. The heavier impurities sink with the magnetite whereas the lighter coal floats and is recovered. About two pounds of magnetite are used for every ton of coal that is cleaned.

### MANGANESE

Eveready Battery Company, Inc., operates a manganese

processing facility in the City of Newport News. Manganese ore, imported from Ghana, Africa and Mexico, is shipped to the Elizabeth River Terminals in the City of Chesapeake. The ore is trucked to the processing plant; quality control of the manganese content and potential contaminants are maintained through continual chemical/mineralogical analyses. The manganese is dried in a gas-fired rotary kiln and crushed with jaw and ball crushers into two basic sizes. Ground ore is shipped in bulk, bulk bags or in bags to plants in Iowa, Ohio and North Carolina. End use for the product is commercial and dry cell batteries.

### MICA

Asheville Mica Company and an affiliate, Mica Company of Canada, process imported mica at facilities in the City of Newport News. Several grades of crude mica are purchased from Madagascar, India and Brazil. Asheville Mica Company produces fabricated plate-mica; Mica Company of Canada uses splittings from Asheville to produce reconstituted plate-mica (Figure 5). Presently no domestic mica is utilized. Mica has been produced in the past from pegmatite bodies in several counties in Virginia, including Amelia, Henry and Powhatan.

Plate mica is marketed for use in hair dryers and for other electrical applications; reconstituted built-up mica is used in washers for terminals and as shields in lithium batteries.

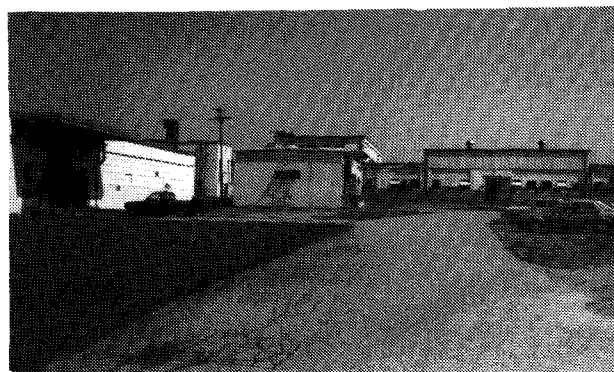


Figure 5. Plant of Asheville Mica Company - Mica Company of Canada in the City of Newport News, Virginia.

### ORNAMENTAL AGGREGATE

Dolomite and quartzite from Botetourt and Rockbridge Counties are marketed as exposed-aggregate materials. Rock materials, such as black limestone (Edinburg Formation) from the Valley and Ridge province and greenstone from the Piedmont province, have been used for terrazzo. Exposaic Industries, Inc. in Spotsylvania County utilizes a variety of rock materials for exposed panels, including greenstone from Albemarle County and Triassic-age sandstone from Culpeper County.

Several rock types have been utilized for ornamental aggregate in past years. Vein quartz was quarried in Albemarle, Buckingham, Fauquier, Fluvanna, Greene, and Rappahannock Counties, and quartz pebbles were extracted

neutralize acid mine water. It is used also for mason's lime, sewage treatment, and agricultural purposes. One of the more important uses of lime in the 1990s will be to abate the  $\text{SO}_2$  and  $\text{NO}_x$  emissions from coal fired boilers.

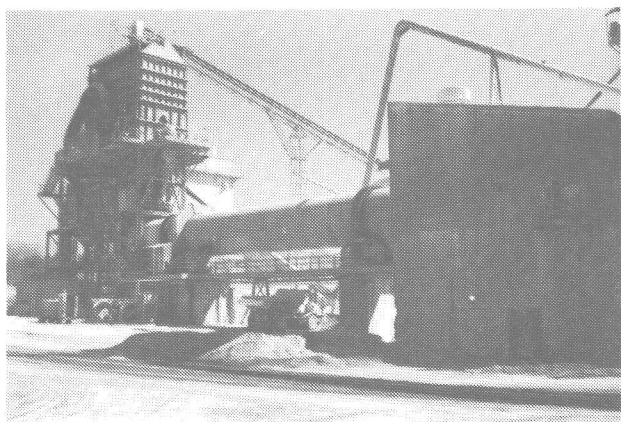


Figure 4. New Market Limestone calcined in coal-fired rotary kiln at Chemstone Corporation, Strasburg, Virginia.

### LITHIUM

Cyprus Foote Mineral Company processes lithium carbonate from brines in Nevada with calcium hydroxide from various sources to produce lithium hydroxide at their Sunbright plant in Scott County. Lithium hydroxide is used in multipurpose grease. In the past, limestone from an underground mine at the Sunbright site was utilized in the manufacturing process and a calcium carbonate precipitate was formed as a waste product. This material remains on the site and may have a potential use. The approximate analysis of the material is 43 to 50 percent  $\text{CaCO}_3$ , 3 to 6 percent  $\text{Ca(OH)}_2$ , and 40 to 48 percent  $\text{H}_2\text{O}$ .

### MAGNETITE

Reiss Viking Corporation in Tazewell County processes out-of-state magnetite for use in cleaning coal. The magnetite is obtained from New York, with minor amounts being imported. Magnetite is dried, ground in a ball mill, classified, and graded by percentage of material passing a 325-mesh sieve; grades produced are 40, 70, 90, 96.5, and 99. The magnetite is marketed in Virginia and Kentucky. In the coal cleaning process, magnetite is mixed with water to form a heavy-media slurry into which raw coal is fed. The heavier impurities sink with the magnetite whereas the lighter coal floats and is recovered. About two pounds of magnetite are used for every ton of coal that is cleaned.

### MANGANESE

Eveready Battery Company, Inc., operates a manganese

processing facility in the City of Newport News. Manganese ore, imported from Ghana, Africa and Mexico, is shipped to the Elizabeth River Terminals in the City of Chesapeake. The ore is trucked to the processing plant; quality control of the manganese content and potential contaminants are maintained through continual chemical/mineralogical analyses. The manganese is dried in a gas-fired rotary kiln and crushed with jaw and ball crushers into two basic sizes. Ground ore is shipped in bulk, bulk bags or in bags to plants in Iowa, Ohio and North Carolina. End use for the product is commercial and dry cell batteries.

### MICA

Asheville Mica Company and an affiliate, Mica Company of Canada, process imported mica at facilities in the City of Newport News. Several grades of crude mica are purchased from Madagascar, India and Brazil. Asheville Mica Company produces fabricated plate-mica; Mica Company of Canada uses splittings from Asheville to produce reconstituted plate-mica (Figure 5). Presently no domestic mica is utilized. Mica has been produced in the past from pegmatite bodies in several counties in Virginia, including Amelia, Henry and Powhatan.

Plate mica is marketed for use in hair dryers and for other electrical applications; reconstituted built-up mica is used in washers for terminals and as shields in lithium batteries.

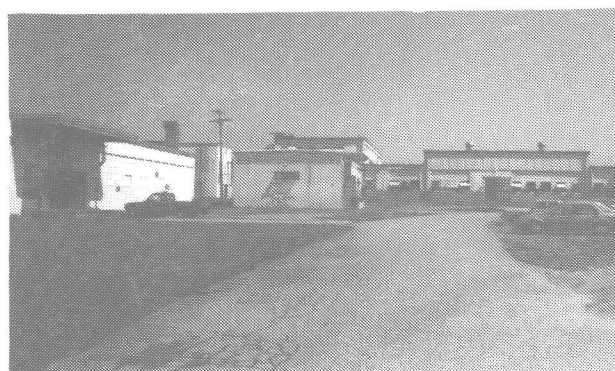


Figure 5. Plant of Asheville Mica Company - Mica Company of Canada in the City of Newport News, Virginia.

### ORNAMENTAL AGGREGATE

Dolomite and quartzite from Botetourt and Rockbridge Counties are marketed as exposed-aggregate materials. Rock materials, such as black limestone (Edinburg Formation) from the Valley and Ridge province and greenstone from the Piedmont province, have been used for terrazzo. Exposaic Industries, Inc. in Spotsylvania County utilizes a variety of rock materials for exposed panels, including greenstone from Albemarle County and Triassic-age sandstone from Culpeper County.

Several rock types have been utilized for ornamental aggregate in past years. Vein quartz was quarried in Albemarle, Buckingham, Fauquier, Fluvanna, Greene, and Rappahannock Counties, and quartz pebbles were extracted



from the flood plain along the Mattaponi River in Caroline County.

### PERLITE

Manville Sales Corporation operates a plant at Woodstock in Shenandoah County to expand perlite (volcanic glass with high water content and "onion-skin" appearance) obtained from Grants, New Mexico. Expanded perlite is used in the manufacture of roof insulation board, which is marketed throughout the eastern United States.

### PHOSPHATE ROCK

TexasGulf, Inc. ships phosphate rock from its Lee Creek operation in North Carolina to Glade Spring, Washington County. It is then transported by truck to the TexasGulf plant in Saltville, Smyth County. A coal-fired rotary kiln is used to defluorinate the phosphate rock. The product is marketed as a poultry and animal feed supplement in the southern and midwestern states.

### SULFUR

Elemental sulfur is recovered from hydrogen sulfide gas by the Claus process during crude-oil refining by Amoco Oil Company (Figure 6). The refinery is adjacent to the York River, near Yorktown. Crude oil is heated in a furnace and fed under pressure into a cylinder where it vaporizes, expands, and condenses into liquid. Hydrogen sulfide is produced and is converted into elemental sulfur. About 42 short tons of sulfur are produced per day and are marketed for use in fertilizer.



Figure 6. Entranceway to refinery of Amoco Oil Company, Yorktown, Virginia

### VERMICULITE

Virginia is one of three states in which vermiculite, a hydrated magnesium-iron-aluminum silicate, is mined Vir-

ginia Vermiculite, Ltd. operates an open-pit mine and processing facility near Boswells Tavern in Louisa County. The vermiculite is mined with a backhoe and front-end loader. The vermiculite is then trucked to the adjacent plant where pieces greater than four inches across are removed. They are washed and run through a rod mill to shear the vermiculite thin. Biotite, feldspar, and other impurities are removed by washing over a riffle table. The vermiculite is further concentrated by flotation cells, dewatered, dried in a rotary kiln, and screened to produce four basic sized products. Most of the crude vermiculite is shipped by rail in unexfoliated form to North Carolina, West Virginia, Ohio, and other eastern states. Uses for the exfoliated material include packing, insulation, lightweight aggregate, and potting material.

from the flood plain along the Mattaponi River in Caroline County.

### PERLITE

Manville Sales Corporation operates a plant at Woodstock in Shenandoah County to expand perlite (volcanic glass with high water content and "onion-skin" appearance) obtained from Grants, New Mexico. Expanded perlite is used in the manufacture of roof insulation board, which is marketed throughout the eastern United States.

### PHOSPHATE ROCK

TexasGulf, Inc. ships phosphate rock from its Lee Creek operation in North Carolina to Glade Spring, Washington County. It is then transported by truck to the TexasGulf plant in Saltville, Smyth County. A coal-fired rotary kiln is used to defluorinate the phosphate rock. The product is marketed as a poultry and animal feed supplement in the southern and midwestern states.

### SULFUR

Elemental sulfur is recovered from hydrogen sulfide gas by the Claus process during crude-oil refining by Amoco Oil Company (Figure 6). The refinery is adjacent to the York River, near Yorktown. Crude oil is heated in a furnace and fed under pressure into a cylinder where it vaporizes, expands, and condenses into liquid. Hydrogen sulfide is produced and is converted into elemental sulfur. About 42 short tons of sulfur are produced per day and are marketed for use in fertilizer.



Figure 6. Entranceway to refinery of Amoco Oil Company, Yorktown, Virginia

### VERMICULITE

Virginia is one of three states in which vermiculite, a hydrated magnesium-iron-aluminum silicate, is mined Vir-

ginia Vermiculite, Ltd. operates an open-pit mine and processing facility near Boswells Tavern in Louisa County. The vermiculite is mined with a backhoe and front-end loader. The vermiculite is then trucked to the adjacent plant where pieces greater than four inches across are removed. They are washed and run through a rod mill to shear the vermiculite thin. Biotite, feldspar, and other impurities are removed by washing over a riffle table. The vermiculite is further concentrated by flotation cells, dewatered, dried in a rotary kiln, and screened to produce four basic sized products. Most of the crude vermiculite is shipped by rail in unexfoliated form to North Carolina, West Virginia, Ohio, and other eastern states. Uses for the exfoliated material include packing, insulation, lightweight aggregate, and potting material.

Table 1. Mineral Production in Virginia - 1990<sub>1P</sub>

Mineral Commodity	Value Quantity	(thousands)
Clay—metric ton	791,675	\$ 5,236
Coal (bituminous) <sub>2/</sub> (\$38.55/ton) <sub>4/</sub> —thousand short tons	46,500	1,792,579
Gemstones	NA	10
Lime—thousand short tons	858	40,077
Natural Gas <sub>2/</sub> (\$2.22/1000 cu. ft.)—million cubic feet	14,774	32,798
Petroleum (crude) <sub>2/</sub> (\$23.77/bl.) <sub>3/</sub> —42-gallon barrels	14,677	349
Sand and gravel—thousand short tons	12,700	52,900
Stone:		
Crushed—do	59,400	320,000
Dimension—short tons	W	W
Combined value of cement, clay (fuller's earth), dimension stone, feldspar, gypsum, industrial sand and gravel, iron oxide pigments (crude), kyanite, sulfur, vermiculite	XX	93,868
Total	XX	\$2,337,817

NA Not available. XX Not applicable. P Preliminary

W Withheld to avoid disclosing company proprietary data.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers) - from U.S. Bureau of Mines.

2/ Virginia Department of Mines, Minerals, and Energy

3/ Oil and Gas Journal volumes - official sales/estimated term price (NON-OPEC).

4/ DOE/EIA - Average Export-Import Price.

Table 2. Summary of Metal/Nonmetal mining and quarrying, 1990.

Commodity	Annual Tonnage	Office Workers	Office Hours	Office Wages	Plant Workers	Quarry Workers	Production Hours	Production Wages
Aplite	317,621.00	3	6,312	\$102,286	0	7	18,040	\$110,460
Basalt	893,810.00	4	5,010	\$49,703	0	14	30,935	\$424,405
Clay	153,683.00	7	2,859	\$43,742	0	17	8,020	\$38,460
Coal Refuse	26,719.00	0	0	\$0	0	1	4,000	\$5,899
Diorite	254,840.00	5	11,066	\$174,844	16	7	51,445	\$465,848
Dirt/Fill Mat	1,706,103.00	46	4,793	\$168,119	11	190	29,480	\$338,669
Dolomite	1,590,120.00	12	25,440	\$838,026	48	22	130,161	\$1,751,083
Feldspar	164,640.00	4	6,922	\$125,886	26	6	72,309	\$891,571
Fullers Earth	47,800.00	8	15,320	\$211,705	42	7	52,083	\$549,753
Gemstones	1.00	0	0	\$0	0	1	100	\$0
Granite	28,821,157.00	154	296,230	\$4,675,953	374	305	1,634,560	\$17,582,145
Gravel	243,388.00	3	263	\$3,704	1	8	4,409	\$68,551
Greenstone	237,490.00	1	3,10	\$23,320	7	2	21,291	\$244,637
Gypsum	299,730.00	6	13,800	\$0	0	61	125,724	\$0
Iron Oxide	300.00	0	0	\$0	0	0	0	\$0
Kyanite	656,225.00	17	32,636	\$385,926	110	30	314,169	\$3,761,796
Limestone	19,581,174.00	264	523,645	\$7,842,057	731	522	2,548,168	\$26,320,622
Limonite	1,504.00	11	22,097	\$343,000	18	4	48,460	\$411,910
Marl	7,427.00	4	4,485	\$33,802	2	16	30,921	\$424,614
Quartz	21,713.00	1	5	\$70	0	1	1,609	\$12,414
Quartzite	1,080,522.00	5	8,238	\$107,863	48	7	120,308	\$1,233,751
Red Dog	5,000.00	0	0	\$0	0	0	0	\$0
Sand	11,625,375.20	103	92,789	\$991,635	73	247	340,303	\$3,636,300
Sand&Gravel	11,538,181.00	50	84,895	\$1,143,049	209	184	821,410	\$7,219,508
Sandstone	1,055,791.00	13	11,577	\$158,847	14	41	79,364	\$799,789
Shale	792,110.00	58	88,771	\$1,278,219	388	51	461,604	\$3,155,878
Silt	0.00	1	2,800	\$22,340	0	0	0	\$0
Slate	474,314.00	27	47,574	\$849,994	160	33	348,751	\$2,635,344
Soapstone	8,055.00	0	20,000	\$220,959	0	12	108,195	\$789,251
Traprock	13,098,308.00	63	119,569	\$2,101,640	142	143	681,209	\$8,563,618
Vermiculite	35,000.00	4	7,648	\$67,060	15	5	43,433	\$395,241
	94,738,101.20	874	1,457,845	\$21,963,749	2,435	1,944	8,130,461	\$81,831,517

Table 3. Summary of Metal/Nonmetal mining and quarrying, by county/city, 1990.

County	Annual Tonnage	Office Workers	Office Hours	Office Wages	Plant Workers	Quarry Workers	Production Hours	Production Wages
Accomack	126,070.00	1	12	\$140	0	9	1,146	\$14,755
Albemarle	1,445,212.00	7	11,256	\$144,70	22	21	73,063	\$1,049,75
Amelia	1.00	0	0	\$0	0	1	100	\$0
Amherst	327,400.00	5	9,212	\$125,876	3	10	19,120	\$119,680
Appomattox	170,293.00	3	3,731	\$29,286	9	5	32,777	\$306,841
Augusta	1,386,600.00	11	22,484	\$246,064	23	60	167,958	\$1,452,016
Bath	6,820.00	0	0	\$0	0	2	138	\$1,372
Bedford	821,060.00	8	14,695	\$188,058	17	27	92,224	\$821,593
Bland	85,366.00	2	2,206	\$36,886	0	12	11,328	\$161,515
Botetourt	2,966,602.00	36	65,858	\$1,440,227	103	69	308,608	\$3,174,786
Brunswick	2,332,640.00	21	46,090	\$689,031	127	18	307,110	\$2,508,071
Buckingham	1,012,032.00	36	65,000	\$1,027,953	227	66	569,562	\$1,128,168
Campbell	1,894,907.00	8	14,446	\$175,455	33	25	116,243	\$1,128,168
Caroline	1,541,075.00	12	24,702	\$249,076	24	9	64,695	\$596,327
Carroll	2,454.00	1	8	\$100	0	3	300	\$3,300
Charles City	823,029.00	3	7,888	\$84,783	7	14	47,813	\$419,442
Charlotte	25,881.00	0	0	\$0	2	8	2,375	\$27,185
Chesapeake (City)	3,345,676.00	19	37,547	\$328,125	4	37	67,418	\$675,780
Chesterfield	3,773,640.00	18	29,301	\$528,733	60	55	320,055	\$2,461,327
Clarke	111,897.00	1	2,014	\$16,832	3	21	22,237	\$194,542
Craig	115,547.00	5	7,358	\$108,125	7	0	19,872	\$140,772
Culpeper	774,031.00	8	7,896	\$83,871	10	26	70,837	\$781,894
Cumberland	2,000.00	0	0	\$0	0	3	480	\$2,160
Danville (City)	15,283.00	1	300	\$2,640	1	1	1,867	\$14,292
Dinwiddie	2,094,200.00	6	12,672	\$264,000	35	19	120,756	\$1,270,000
Essex	117,810.00	0	0	\$0	6	2	1,460	\$20,230
Fairfax	4,011,470.00	20	35,733	\$600,116	25	35	154,181	\$2,102,199
Fauquier	1,460,580.00	21	14,063	\$709,794	18	23	73,592	\$327,113
Fluvanna	7,780.00	1	12	\$80	0	2	895	\$5,820
Franklin	12,500.00	0	0	\$0	2	0	1,353	\$8,123
Frederick	2,742,058.00	34	42,014	\$614,168	118	81	444,441	\$4,191,809
Giles	1,024,316.00	24	52,250	\$943,640	130	68	401,984	\$4,446,247
Gloucester	271,667.00	7	3,562	\$40,430	12	9	8,790	\$18,688
Goochland	3,837,450.00	18	30,300	\$368,107	13	39	134,089	\$1,544,928
Grayson	340,730.00	6	9,335	\$83,689	11	12	41,386	\$323,615
Greene	885,000.00	3	2,995	\$34,120	0	12	31,090	\$306,176
Greensville	2,152,024.00	23	41,712	\$582,789	135	19	330,364	\$2,470,413
Halifax	554,647.00	6	13,756	\$213,350	17	13	39,753	\$447,244
Hampton (City)	259,865.00	0	0	\$0	0	10	12,686	\$111,135
Hanover	2,632,066.00	14	19,872	\$351,277	63	40	217,060	\$2,922,110
Henrico	3,468,086.00	9	16,578	\$182,234	54	41	190,931	\$1,921,960
Henry	1,127,569.00	12	19,263	\$317,246	30	28	123,582	\$1,126,332
Highland	4,593.00	1	1,105	\$2,542	0	2	3,147	\$18,319
Isle of Wight	808,557.00	17	20,681	\$157,155	10	65	128,577	\$1,738,804
James City	161,210.00	4	1,737	\$21,320	4	2	3,254	\$39,139
King and Queen	318,757.00	11	17,920	\$268,573	52	15	89,158	\$856,796
King George	1,619,043.00	9	10,373	\$117,742	21	28	77,747	\$663,815
King William	270,445.00	2	3,991	\$46,450	4	8	19,807	\$227,974
Lancaster	73,521.00	1	5	\$30	0	4	5,131	\$2,950
Lee	209,708.00	2	4,719	\$35,650	3	5	15,852	\$124,980
Loudoun	7,059,589.00	36	71,281	\$1,286,477	93	90	429,798	\$5,160,528
Louisa	210,473.00	14	18,842	\$179,238	17	36	77,471	\$744,849
Lunenburg	54,220.00	0	0	\$0	0	3	273	\$5,412
Madison	30,600.00	2	4	\$200	0	5	480	\$3,840
Mathews	7,500.00	1	12	\$45	0	2	1,960	\$9,000
Mecklenburg	288,193.00	6	5,816	\$56,328	17	6	50,833	\$496,194
Middlesex	94,026.00	1	30	\$270	1	8	3,141	\$20,300
Montgomery	1,529,830.00	31	41,464	\$552,641	102	31	107,415	\$862,862
Nelson	13,788.00	1	20,022	\$221,091	0	15	108,489	\$791,051
New Kent	5,537.00	2	25	\$325	2	6	552	\$5,149
Northampton	10,219.00	1	240	\$1,860	0	11	1,101	\$7,437
Northumberland	44,154.00	1	65	\$1,000	0	3	4,544	\$0
Nottoway	608,680.00	3	2,700	\$33,137	0	14	31,138	\$313,478
Orange	133,620.00	8	2,770	\$40,725	4	9	2,032	\$19,960
Patrick	5.00	0	0	\$0	0	1	1,248	\$0
Pittsylvania	184,706.00	12	18,687	\$250,154	27	21	50,544	\$481,784
Powhatan	1,031,344.00	3	4,416	\$36,558	0	10	26,347	\$285,556
Prince Edward	35,000.00	1	1,590	\$15,515	17	0	46,309	\$411,266
Prince George	1,290,400.00	3	6,336	\$122,000	17	22	82,068	\$920,000
Prince Wm.	3,917,743.00	20	40,645	\$807,857	49	28	162,996	\$2,628,514
Pulaski	517,532.00	15	31,525	\$403,449	30	10	88,709	\$712,596
Rappahannock	1,203.00	0	0	\$0	0	2	62	\$992
Richmond	144,500.00	0	0	\$0	0	2	953	\$6,720

## VIRGINIA DIVISION OF MINERAL RESOURCES

Richmond (City)	1,869,709.00	7	14,720	\$192,147	26	21	133,202	\$1,274,372
Roanoke	1,665,120.00	18	38,040	\$945,026	131	25	136,161	\$1,793,083
Rockbridge	453,812.00	19	35,040	\$373,722	13	29	66,807	\$490,782
Rockingham	2,102,420.00	28	32,502	\$447,172	51	51	125,863	\$1,107,174
Russell	1,601,808.00	19	43,095	\$422,066	63	32	201,401	\$1,737,659
Scott	24,838.00	1	547	\$3,053	0	2	1,876	\$13,655
Shenandoah	1,375,258.00	31	65,855	\$1,238,150	80	44	236,188	\$2,460,434
Smyth	445,783.00	12	21,432	\$103,110	1	74	143,253	\$153,787
Southampton	845,059.00	3	2,961	\$25,534	13	23	29,048	\$159,755
Spotsylvania	1,434,628.00	7	11,432	\$152,762	43	18	115,145	\$1,204,106
Stafford	2,632,060.00	15	26,332	\$389,513	24	19	92,846	\$1,238,666
Suffolk (City)	4,457,120.00	8	8,509	\$48,784	1	22	33,653	\$330,231
Surry	3,894.00	0	0	\$0	0	1	38	\$304
Sussex	27,666.00	1	6	\$2,017	2	8	1,604	\$23,304
Tazewell	1,438,029.00	9	20,167	\$167,401	32	31	114,476	\$1,299,659
Virginia Beach (City)	697,651.20	13	10,629	\$249,802	2	20	23,920	\$330,293
Warren	655,658.00	39	82,308	\$1,506,054	63	25	187,697	\$3,237,071
Washington	248,100.00	2	2,726	\$23,509	6	11	4,102	\$332,940
Westmoreland	106,782.00	1	0	\$0	0	6	5,554	\$60,252
Wise	149,324.00	7	640	\$5,764	4	26	10,569	\$112,461
Wythe	1,490,112.00	14	24,758	\$176,975	59	33	194,123	\$1,495,191
York	229,240.00	2	3,024	\$21,852	0	4	6,080	\$132,000
	94,738,101.20	874	1,457,845	\$21,963,749	2,435	1,944	8,130,461	\$81,831,517

Table 4. Summary of coal mine production in Virginia, 1990.

	Buchanan	Dickenson	Lee Montgomery	Russell	Scott	Tazewell	Wise	Total
<b>Number of Mines</b>								
Auger	1	9	6	0	1	0	15	32
Strip	28	28	8	2	6	0	45	118
Surf Total	29	37	14	2	7	0	50	150
Tipple	14	9	1	0	3	0	2	32
Truck	153	53	19	0	9	1	43	307
Undg Total	157	62	20	0	12	1	45	339
TOTAL	196	99	34	2	19	1	105	469
<b>Tonnages</b>								
Auger	4,317	46,036	33,093	0	0	0	73,911	157,355
Strip	1,473,240	1,081,533	352,237	1,291	225,553	0	4,354,391	7,488,254
Surf Total	1,477,556	1,127,569	395,331	1,291	225,563	0	4,428,301	7,545,610
Tipple	9,592,058	1,791,945	1,232,124	0	0	556,071	1,173,806	14,346,002
Truck	9,763,922	3,852,894	1,330,395	0	482,897	50,754	6,341,920	24,508,494
Undg Total	19,355,980	5,644,839	2,562,519	0	482,897	50,764	7,515,724	38,854,496
TOTAL	20,833,537	6,772,408	2,947,850	1,291	708,459	50,754	11,944,025	45,500,106
<b>Mining Methods:</b>								
<b>Underground:</b>								
<b>Longwall</b>								
Tipple	6,915,428	695,507	1,088,750	0	0	0	895,755	9,585,441
Truck	0	213,532	0	0	0	0	0	213,532
Total	6,915,428	900,039	1,089,750	0	0	0	895,756	9,799,973
<b>Cont. Miner</b>								
Tipple	2,676,630	1,105,438	143,374	0	0	556,071	278,048	4,759,561
Truck	8,708,904	3,178,858	1,330,395	0	482,897	50,764	6,341,920	22,777,392
TOTAL	11,385,534	4,284,306	1,473,769	0	482,897	50,764	6,619,968	27,536,953
<b>Other</b>								
Tipple	0	0	0	0	0	0	0	0
Truck	1,055,018	460,495	0	0	0	2,057	0	1,517,570
TOTAL	1,055,018	460,495	0	0	0	2,057	0	1,517,570
TOTAL UND G	19,355,980	5,644,839	2,562,519	0	482,897	50,764	7,515,724	38,854,496
<b>Surface:</b>								
Auger	4,317	46,036	33,093	0	0	0	73,911	157,355
Strip	1,473,240	1,081,533	352,237	1,291	225,563	0	4,354,391	7,488,254
TOTAL SURF	1,477,556	1,127,569	385,331	1,291	225,563	0	4,426,301	7,545,510

Table 5. Summary of coal mining in Virginia, by coal bed, 1990 (short tons)\*.

	Buchanan	Dickenson	Lee	Montgomery	Russell	Scott	Tazewell	Wise	Total
Aily	0	0	0	0	0	0	0	7,038	7,038
Big Fork	0	0	0	0	20,109	0	0	0	20,109
Blair	1,078,664	2,178	0	0	0	0	0	383,020	1,463,862
Campbell Creek	0	0	0	0	0	0	0	214,789	214,789
Cedar Grove	0	0	0	0	0	0	0	203,874	203,874
Clintwood	210,773	399,226	9,368	0	0	0	0	1,901,135	2,520,502
Cove Creek	0	0	0	0	0	50,764	0	0	50,764
Dorchester	175,671	636,942	0	0	0	0	0	3,938,443	4,751,056
Eagle	605,854	13,943	0	0	0	0	0	0	619,797
Gin Creek	0	0	2,106	0	0	0	0	0	2,106
Greasy Creek	0	0	0	0	0	0	879,034	0	879,034
Hagy	679,619	136,523	0	0	0	0	0	0	816,142
High Splint	0	0	0	0	0	0	0	188,575	188,575
Jawbone	2,554,912	1,318,264	0	0	374,827	0	0	339,793	4,587,796
Kelly	0	0	96,983	0	0	0	0	1,022,576	1,119,559
Kennedy	1,283,619	0	0	0	298,697	0	0	2,833	1,585,149
Lower Banner	77,859	1,332,337	0	0	0	0	0	7,590	1,417,786
Lower Horsepen	0	0	0	0	0	0	131,628	0	131,628
Low Splint	0	0	45,074	0	0	0	0	748,569	793,643
Lower Seaboard	0	0	0	0	0	0	558,128	0	558,128
Lower St. Charles	0	0	597,348	0	0	0	0	0	597,348
Lyons	0	0	0	0	0	0	0	395,151	395,151
Merimac	0	0	0	1,291	0	0	0	0	1,291
Morris	0	0	0	0	0	0	0	140,040	140,040
Middle Seaboard	0	0	0	0	0	0	36,568	0	36,568
Pardee	0	0	61,854	0	0	0	0	278,820	340,674
Phillips	0	0	261,839	0	0	0	0	120,626	382,465
Pinhook	0	0	0	0	0	0	0	41,796	41,796
Pocahontas #3	9,592,058	0	0	0	0	0	265,468	0	9,857,526
Pocahontas #5	0	0	0	0	0	0	23,195	0	23,195
Raven	1,363,537	607,635	0	0	5,258	0	301,550	6,884	2,284,866
Splashdam	2,954,508	716,960	10,128	0	0	0	0	247,250	3,928,846
Taggart	0	0	1,304,452	0	0	0	0	634,167	1,938,619
Taggart Marker	0	0	0	0	0	0	0	214,680	214,680
Tiller	256,462	142,518	0	0	0	0	170,078	0	569,058
Upper Banner	0	1,465,882	0	0	9,569	0	0	227,288	1,702,739
Upper Horsepen	0	0	0	0	0	0	876,123	0	876,123
Upper Standiford	0	0	217,624	0	0	0	0	679,089	896,713
Wax	0	0	341,073	0	0	0	0	0	341,073
	20,833,597	6,772,408	2,947,850	1,291	708,459	50,764	3,241,772	11,944,025	46,500,106

\* Coal bed and county totals may differ slightly because of rounding.

Table 6. Summary of coal employment in Virginia, 1990.

	Buchanan	Dickenson	Lee	Montgomery	Russell	Scott	Tazewell	Wise	Total
Prod. Employees									
Auger	3	5	7	0	0	0	0	36	57
Strip	208	315	25	2	46	0	0	823	1,491
Surf Total	211	321	93	2	46	0	0	859	1,532
Tipple	1,654	480	192	0	0	0	158	244	2,728
Truck	2,575	962	331	0	130	16	456	1,449	5,028
Undg Total	4,330	1,442	523	0	130	16	614	1,693	8,742
TOTAL	4,541	1,763	515	2	175	16	614	2,552	10,280
Man Days									
Auger	141	720	410	0	0	0	0	1,352	2,633
Strip	44,835	38,661	23,192	576	7,764	0	0	160,662	275,680
Surf Total	44,976	39,381	23,502	576	7,764	0	0	162,014	278,313
Tipple	390,252	126,713	48,192	0	0	0	45,260	61,244	670,671
Truck	546,055	205,165	56,345	0	22,152	3,200	101,301	331,289	1,265,508
Undg Total	935,317	330,878	104,538	0	22,152	3,200	145,561	392,533	1,936,179
TOTAL	981,293	370,259	128,140	576	29,916	3,200	146,561	554,547	2,214,492
Man Hours									
Auger	1,146	2,948	2,805	0	0	0	0	9,471	16,372
Strip	365,042	334,830	170,484	4,600	58,249	0	0	1,421,529	2,365,734
Surf Total	367,190	337,778	173,269	4,600	58,249	0	0	1,431,000	2,392,106
Tipple	3,673,628	938,779	375,562	0	0	0	298,034	478,644	5,814,647
Truck	3,965,195	1,682,384	511,179	0	172,080	25,529	747,573	2,503,757	9,508,697
Undg Total	7,639,823	2,671,163	886,741	0	172,080	25,529	1,045,607	2,982,401	15,423,344
TOTAL	8,007,013	3,008,941	60,030	4,600	240,329	25,529	1,045,607	4,413,401	17,905,450

## VIRGINIA DIVISION OF MINERAL RESOURCES

	Buchanan	Dickenson	Lee	Montgomery	Russell	Scott	Tazewell	Wise	Total
Prod. Wages									
Auger	20,934	54,820	33,382	0	0	0	0	213,926	323,054
Strip	5,879,750	4,763,783	1,781,723	22,324	1,071,253	0	0	19,748,853	33,267,696
Surf Total	5,900,694	4,818,603	1,815,105	22,324	1,071,253	0	0	19,962,781	33,590,760
Tipple	51,792,815	18,354,337	7,890,177	0	0	0	5,701,802	11,149,435	104,888,616
Truck	57,046,826	24,777,515	7,970,502	0	2,842,229	285,522	13,887,837	42,374,371	149,185,802
Undg Total	118,839,641	43,131,852	15,860,679	0	2,842,229	286,522	19,589,639	53,523,866	254,074,418
TOTAL	124,740,335	47,950,455	17,675,784	22,324	3,913,482	286,522	19,589,639	73,465,637	207,665,178
Office Employees									
Auger	1	0	1	0	0	0	0	0	2
Strip	5	17	5	0	1,259	0	0	24	1,310
Surf Total	6	17	6	0	1,259	0	0	24	1,312
Tipple	25	8	5	0	0	0	0	8	46
Truck	137	27	6	0	2	1	12	41	220
Undg Total	152	35	13	0	2	1	12	49	274
TOTAL	169	52	19	1,259	0	0	12	73	1,596
Office Wages									
Auger	1,200	0	16,100	0	0	0	0	0	17,300
Strip	35,300	247,421	124,691	0	109,845	0	0	1,112,609	1,680,872
Surf Total	37,500	247,421	140,797	0	109,845	0	0	1,112,609	1,698,172
Tipple	754,180	170,856	208,499	0	0	0	0	306,495	1,440,024
Truck	2,809,070	479,933	63,440	0	31,847	5,492	284,801	1,411,175	5,895,759
Undg Total	3,563,250	650,789	271,939	0	31,847	5,492	284,801	1,717,665	6,525,733
TOTAL	3,650,750	899,210	412,735	0	141,592	5,492	284,801	2,930,274	8,223,955

Table 7. Oil Production by Company and Field, 1990.

Field	Company	Producing Wells	
		Number	Bbls.
Ben Hur	APACO Petroleum	4	665.73
	Ben Hur Oil	5	2,103.00
	Eastern States	1	1,884.00
	PVRC	3	1,458.27
	Southern Exploration	1	53.00
	Witt Oil and Gas	1	115.00
Knox	Stonewall	1	106.00
Roaring Fork	ANR Production	20	2,659.39
Rose Hill	PVRC	2	3,128.35
	Pride Oil Company	1	1,631.16
	Stonewall Gas	3	873.00
TOTAL		42	14,676.90

Table 8. Gas Production by Company and in each County, 1990.

Field	Company	Number	Volume (Mcf)
Buchanan	Ashland Exploration	47	544,358
	Berea Oil and Gas	1	53,446
	Cabot Oil and Gas	3	26,085
	CDG Development	1	23,611
	Columbia Gas	101	1,847,148
	EHPC	9	216,669
	Edisto	4	65,060
	OXY USA	1	17,608
	P & S	6	28,555
	Panther Creek Ltd.	2	18,731
	Peake	1	45,848
	Total	176	2,887,119
Dickenson	ANR Production	2	31,192
	Columbia Gas	32	736,186
	W. E. Elliott	2	30,588
	EHPC	4	33,351
	EREX	346	7,013,351
	Pine Mountain	9	99,447
	Total	395	7,944,115
Russell	Pine Mountain	1	13,459
Scott	ANR Production	1	2,590
	PVRC	13	135,385
	Total	14	137,975
Tazewell	CNG Development	1	4,095
	Columbia Gas	6	175,138
	Consol-Ray	13	213,131
	Excel	1	23,646
	R & B Petroleum	2	27,123
	Scott Oil & Gas	2	44,463
	Total	25	487,596
Washington	PVRC	7	28,934
Wise	Amvest	6	34,518
	ANR Production	173	2,393,401
	EREX	22	846,467
	Total	201	3,274,386
	TOTAL	819	14,773,584



Table 9. Well Completions Summary, 1990.

County	Producing		Dry		Not Comp		Total
	Dev	Expl	Dev	Expl	Dev	Expl	
Buchanan	22	0	0	0	26	0	48
Dickenson	49	8	2	0	0	0	59
Russell	2	0	0	0	0	0	2
Tazewell	1	0	0	0	0	0	1
Wise	8	3	0	0	0	0	11
TOTAL	82	11	2	0	26	0	121

Table 10. Footage drilled for gas, 1990.

County	Conventional		Coalbed Methane		Total Footage
	Dev	Expl	Dev	Expl	
Buchanan	107,473	0	53,021	0	160,494
Dickenson	76,120	12,125	77,914	12,304	178,463
Russell	0	0	4,694	0	4,694
Tazewell	4,975	0	0	0	4,975
Wise	46,088	5,288	0	5,509	56,885
TOTAL	234,656	17,413	135,629	17,813	405,511

Table 11. Wells drilled in Virginia, 1990.

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude	Longitude	Well Class	Depth (feet)	Total Formation at T.D.	Producing Formation	Initial Flow (Mcfd)	Final Flow (Mcfd)
<b>Buchanan County</b>												
BU-223	826	Cabot Oil & Gas	PMC-9	Bradshaw	5200'S.	6700'W.	Dev.	5670	Brallier Sh	Berea Ss	26	1540
					37°17'30"	81°47'30"						
BU-258	1318	Edwards & Harding	EH-17	Bradshaw	5800'S.	10700'W.	Dev.	5303	Chattanooga Sh	Berea Ss, Price	0	622
					37°17'30"	81°50'00"					0	933
BU-275	1444	Cabot Oil & Gas	PMC A-1	Bradshaw	3400'S.	10700'W.	Dev.	5212	Brallier Sh	Berea Ss		
					37°17'30"	81°50'00"						
BU-237	1129	Columbia Natural Resc.	21678	Elkhorn City	7300'S.	6025'W.	Dev.	5397	Chattanooga Sh	Greenbrier Ls	0	197
					37°20'00"	82°15'00"						
BU-238	1144	Columbia Natural Resc.	21614	Harman	8150'S.	7050'W.	Dev.	5795	Chattanooga Sh	Berea Ss	32	419,
					37°17'30"	82°12'30"						189
BU-256	1316	CDG Development	DBVA 2	Hurley	14500'S.	9300'W.	Dev.	5000	Chattanooga Sh	Chattanooga Sh, Berea Ss	show	231
					37°30'00"	82°02'30"						175
BU-278	1467	CDG Development	DBVA 3	Hurley	6010'S.	2100'W.	Dev.	4700	Chattanooga Sh	Chattanooga Sh	0	120
					37°29'00"	82°03'00"						
BU-264	1401	OXY USA	CBM K-24	Keen Mountain	5160'S.	4800'W.	Dev.	1911	Pocahontas	Not completed		
					37°15'00"	81°57'30"						
BU-265	1402	OXY USA	CBM L-24	Keen Mountain	6660'S.	5200'W.	Dev.	1885	Pocahontas	Not completed		
					37°15'00"	81°57'30"						
BU-268	1406	OXY USA	CBM K-25	Keen Mountain	5760'S.	3460'W.	Dev.	1914	Pocahontas	Not completed		
					37°15'00"	81°57'30"						
BU-269	1407	OXY USA	CBM L-25	Keen Mountain	6860'S.	3460'W.	Dev.	1890	Pocahontas	Not completed		
					37°15'00"	81°57'30"						
BU-272	1417	OXY USA	CBM P-26	Keen Mountain	15000'S.	800'W.	Dev.	2137	Pocahontas	Not completed		
					37°15'00"	81°57'30"						
BU-273	1417	OXY USA	CBM R-26	Keen Mountain	2200'S.	700'W.	Dev.	2189	Pocahontas	Not completed		
					37°12'30"	81°57'30"						
BU-281	1489	Edwards & Harding	EH-33	Keen Mountain	4050'S.	5550'W.	Dev.	5226	Chattanooga Sh	Berea Ss	show	158
					37°15'00"	81°52'30"						
BU-291	1501	Edwards & Harding	EH-30	Keen Mountain	1790'S.	7000'W.	Dev.	4675	Chattanooga Sh	Berea Ss	0	576
					37°15'00"	81°52'30"						
BU-246	1283	Ashland Exploration	17-V	Patterson	10625'S.	2875'W.	Dev.	5003	Chattanooga Sh	Berea Ss	show	978
					37°20'00"	81°55'00"						
BU-249	1296	Edwards & Harding	EH-10	Patterson	12150'S.	8000'W.	Dev.	5511	Chattanooga Sh	Berea Ss, Greenbrier Ls	1356	1700,
					37°17'30"	81°52'30"					0	1356
BU-250	1297	Edwards & Harding	EH-15	Patterson	12100'S.	5780'W.	Dev.	5347	Chattanooga Sh	Berea Ss		1443
					37°17'30"	81°52'30"						
BU-251	1306	Edwards & Harding	EH-12	Patterson	14830'S.	650'W.	Dev.	5327	Chattanooga Sh	Berea Ss	0	737
					37°17'30"	81°55'00"						
BU-252	1307	Edwards & Harding	EH-13	Patterson	14400'S.	7900'W.	Dev.	5040	Chattanooga Sh	Berea Ss, Greenbrier Ls	467	778,
					37°17'30"	81°52'30"						467
BU-253	1313	Ashland Exploration	Rogers 28	Patterson	8950'S.	770'W.	Dev.	4857	Chattanooga Sh	Berea Ss	show	226
					37°17'30"	81°55'00"						
BU-254	1314	Ashland Exploration	Rogers 29	Patterson	6425'S.	10825'W.	Dev.	4878	Chattanooga Sh	Berea Ss	show	902
					37°17'30"	81°52'30"						
BU-255	1315	Ashland Exploration	Rogers 30	Patterson	3100'S.	10125'W.	Dev.	4869	Chattanooga Sh	Berea Ss	show	3352
					37°17'30"	81°52'30"						
BU-257	1317	Edwards & Harding	EH-16	Patterson	6450'S.	720'W.	Dev.	5102	Chattanooga Sh	Berea Ss, Greenbrier Ls		1356,
					37°17'30"	81°52'30"						327
BU-262	1378	Edwards & Harding	EH-19	Patterson	12200'S.	4800'W.	Dev.	4903	Chattanooga Sh	Berea Ss	0	492
					37°17'30"	81°55'00"						
BU-270	1411	Edwards & Harding	EH-34	Patterson	9600'S.	2800'W.	Dev.	4857	Chattanooga Sh	Berea Ss	0	1078
					37°17'30"	81°52'30"						
BU-276	1453	Edwards & Harding	EH-35	Patterson	11650'S.	1850'W.	Dev.	4836	Chattanooga Sh	Berea Ss	0	1185
					37°17'30"	81°52'30"						
BU-279	1469	Edwards & Harding	EH-28	Patterson	14900'S.	5800'W.	Dev.	5074	Chattanooga Sh	Berea Ss	0	119
					37°17'30"	81°52'30"						
BU-259	1366	OXY USA	CBM Z-10	Vansant	3075'S.	6000'W.	Dev.	2293	Pocahontas	Not completed		
					37°10'00"	82°02'30"						
BU-260	1370	OXY USA	CBM BB-9	Vansant	6850'S.	7620'W.	Dev.	2239	Pocahontas	Not completed		
					37°10'00"	82°02'30"						
BU-261	1371	OXY USA	CBM BB-12	Vansant	6080'S.	3100'W.	Dev.	2196	Pocahontas	Not completed		
					37°10'00"	82°02'30"						
BU-263	1399	OXY USA	CBM X-11	Vansant	14575'S.	3900'W.	Dev.	1770	Pocahontas	Not completed		
					37°12'30"	82°02'30"						
BU-267	1404	OXY USA	CBM X-10	Vansant	14850'S.	6350'W.	Dev.	1576	Pocahontas	Not completed		
					37°12'30"	82°02'30"						
BU-271	1416	OXY USA	CBM Z-12	Vansant	3050'S.	3000'W.	Dev.	1932	Pocahontas	Not completed		
					37°10'00"	82°02'30"						
BU-295	1507	OXY USA	CBM T-2	Vansant	6250'S.	8960'W.	Dev.	2536	Pocahontas	Not completed		
					37°12'30"	82°05'00"						
BU-296	1508	OXY USA	CBM BB-10	Vansant	6240'S.	6040'W.	Dev.	2366	Pocahontas	Not completed		
					37°10'00"	82°02'30"						
BU-297	1509	OXY USA	CBM Z-11	Vansant	2740'S.	4720'W.	Dev.	2310	Pocahontas	Not completed		
					37°10'00"	82°02'30"						
BU-300	1525	OXY USA	CBM T-4	Vansant	6150'S.	5150'W.	Dev.	2270	Pocahontas	Not completed		
					37°12'30"	82°05'00"						
BU-301	1526	OXY USA	CBM X-9	Vansant	14520'S.	7980'W.	Dev.	1514	Pocahontas	Not completed		
					37°12'30"	82°02'30"						
BU-300	1525	OXY USA	CBM T-4	Vansant	6150'S.	5150'W.	Dev.	2270	Pocahontas	Not completed		
					37°12'30"	82°05'00"						
BU-301	1526	OXY USA	CBM X-9	Vansant	14520'S.	7980'W.	Dev.	1514	Pocahontas	Not completed		
					37°12'30"	82°02'30"						
BU-302	1527	OXY USA	CBM Y-9	Vansant	1300'S.	8540'W.	Dev.	1490	Pocahontas	Not completed		
					37°10'00"	82°02'30"						
BU-303	1528	OXY USA	CBM AA-10	Vansant	5150'S.	5990'W.	Dev.	2311	Pocahontas	Not completed		
					37°10'00"	82°02'30"						

## VIRGINIA DIVISION OF MINERAL RESOURCES

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude	Longitude	Well Class	Depth (feet)	Total Formation at T.D.	Producing Formation	Initial Flow (Mcf/d)	Final Flow (Mcf/d)
BU-304	1529	OXY USA	CBM T-3	Vansant	6200'S. 37°12'30"	7420'W. 82°05'00"	Dev.	2422	Pocahontas	Not completed		
BU-305	1530	OXY USA	CBM BB-7	Vansant	6240'S. 37°10'00"	12060'W. 82°02'30"	Dev.	2200	Pocahontas	Not completed		
BU-306	1531	OXY USA	CBM AA-8	Vansant	4840'S. 37°10'00"	10180'W. 82°02'30"	Dev.	2072	Pocahontas	Not completed		
BU-307	1532	OXY USA	CBM BB-8	Vansant	6780'S. 37°10'00"	9820'W. 82°02'30"	Dev.	2146	Pocahontas	Not completed		
BU-310	1538	OXY USA	CBM T-5	Vansant	7250'S. 37°12'30"	2900'W. 82°05'00"	Dev.	1582	Pocahontas	Not completed		
BU-312	1540	OXY USA	CBM Y-11	Vansant	460'S. 37°10'00"	4760'W. 82°02'30"	Dev.	1745	Pocahontas	Not completed		
BU-313	1541	OXY USA	CBM AA-7	Vansant	4880'S. 37°10'00"	420'W. 82°05'00"	Dev.	2125	Pocahontas	Not completed		
Dickenson County												
DI-403	1092	EREX, Inc.	P-436C	Caney Ridge	11130'S. 37°05'00"	6920'W. 82°22'00"	Dev.	2576	Bluestone	Pocahontas, Lee	0	35
DI-466	1333	EREX, Inc.	PC-007	Caney Ridge	2080'S. 37°02'30"	1080'W. 82°22'30"	Dev.	2228	Bluestone	Pocahontas, Lee	47	127
DI-472	1343	EREX, Inc.	PC-008	Caney Ridge	11190'S. 37°05'00"	450'W. 82°22'30"	Dev.	2571	Bluestone	Pocahontas, Lee	75	60
DI-506	1470	EREX, Inc.	PC-011	Caney Ridge	7990'S. 37°05'00"	7450'W. 82°22'30"	Dev.	2212	Bluestone	Pocahontas, Lee	15	25
DI-395	1077	EREX, Inc.	P-441	Clintwood	3641'S. 37°12'30"	10265'W. 82°27'30"	Exp.	5406	Chattanooga Sh	Chattanooga Sh	0	257
DI-475	1367	EREX, Inc.	P-330	Clintwood	11310'S. 37°10'00"	5150'W. 82°22'30"	Dev.	5116	Chattanooga Sh	Chattanooga Sh	60	1292
DI-476	1369	Edwards & Harding	EH-18	Clintwood	13600'S. 37°10'00"	5150'W. 82°22'30"	Dev.	5044	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls	0	1996
DI-478	1394	EREX, Inc.	P-369	Clintwood	14975'S. 37°12'30"	7130'W. 82°22'30"	Dev.	4376	Chattanooga Sh	Chattanooga Sh	0	66
DI-479	1395	EREX, Inc.	P-491	Clintwood	7510'S. 37°10'00"	6805'W. 82°22'30"	Dev.	4494	Chattanooga Sh			
DI-480	1396	EREX, Inc.	P-493	Clintwood	7765'S. 37°12'30"	3125'W. 82°22'30"	Dev.	4438	Chattanooga Sh	Chattanooga Sh		
DI-490	1429	EREX, Inc.	P-368	Clintwood	12510'S. 37°12'30"	6090'W. 82°22'30"	Dev.	4713	Chattanooga Sh			
DI-493	1432	EREX, Inc.	P-494	Clintwood	5550'S. 32°12'30"	1065'W. 82°22'30"	Dev.	2467				
DI-523	1499	EREX, Inc.	P-374	Clintwood	1650'S. 37°10'00"	4980'W. 82°22'30"	Dev.	4731	Chattanooga Sh			
DI-464	1324	EREX, Inc.	PC-128	Duty	12620'S. 37°05'00"	9900'W. 82°12'30"	Dev.	3094	Bluestone	Pocahontas, Lee	0	15
DI-465	1325	EREX, Inc.	PC-129	Duty	13800'S. 37°05'00"	11380'W. 82°12'30"	Exp.	2918	Bluestone	Pocahontas, Lee	0	3
DI-469	1336	EREX, Inc.	PC-117	Duty	7550'S. 37°05'00"	11750'W. 82°12'30"	Dev.	2879	Bluestone	Lee	0	185
DI-470	1337	EREX, Inc.	PC-121	Duty	9480'S. 37°05'00"	9610'W. 82°12'30"	Dev.	2929	Bluestone	Pocahontas, Lee	0	65
DI-471	1342	EREX, Inc.	PC-131	Duty	11180'S. 37°05'00"	8050'W. 82°12'30"	Dev.	2853	Bluestone	Pocahontas, Lee	0	9
DI-477	1391	EREX, Inc.	PC-135	Duty	6525'S. 37°05'00"	1775'W. 82°12'30"	Exp.	1796	Bluestone	Pocahontas, Lee	0	69
DI-486	1422	EREX, Inc.	PC-305	Duty	14510'S. 37°05'00"	9650'W. 82°07'30"	Dev.	1995	Bluestone	Pocahontas, Lee	133	96
DI-487	1423	EREX, Inc.	PC-136	Duty	1820'S. 37°02'30"	10900'W. 82°12'30"	Dev.	2973	Bluestone	Pocahontas, Lee	0	37
DI-488	1427	EREX, Inc.	PC-140	Duty	3850'S. 37°02'30"	10080'W. 82°12'30"	Dev.	2432	Bluestone	Pocahontas, Lee	0	20
DI-489	1440	EREX, Inc.	PC-308	Duty	6050'S. 37°05'00"	10075'W. 82°07'30"	Dev.	1800	Bluestone	Pocahontas, Lee	0	24
DI-495	1437	EREX, Inc.	PC-141	Duty	4025'S. 37°02'30"	2800'W. 82°12'30"	Dev.	3130	Bluestone	Pocahontas, Lee	0	7
DI-516	1481	EREX, Inc.	PC-309	Duty	5300'S. 37°07'30"	1100'W. 82°10'00"	Dev.	1727	Bluestone	Pocahontas, Lee		
DI-498	1440	Edwards & Harding	EH-40	Elkhorn City	11100'S. 37°17'30"	10900'W. 82°17'30"	Dev.	3503	Chattanooga Sh	Chattanooga Sh Berea Ss	0	1078
DI-326	950	EREX, Inc.	P-325	Haysi	2100'S. 37°10'00"	5850'W. 82°15'00"	Dev.	2963	Hinton	Plugged and Abdn		
DI-426	1149	Columbia Natural Resources	21613	Haysi	6000'S. 37°15'00"	4200'W. 82°15'00"	Dev.	5763	Chattanooga Sh,	Chattanooga Sh Berea Ss	133	189, 260
DI-441	1248	EREX, Inc.	P-475	Haysi	4975'S. 37°12'30"	11475'W. 82°20'00"	Dev.	1825	Bluestone	Plugged and Abdn		
DI-481	1409	Edwards & Harding	EH-20	Haysi	8050'S. 37°12'30"	11300'W. 82°15'00"	Dev.	4794	Chattanooga Sh	Chattanooga Sh, Berea Ss	0	696
DI-482	1140	Edwards & Harding	EH-24	Haysi	7100'S. 37°12'30"	8940'W. 82°15'00"	Exp.	2273	Hinton	Ravencruff	4700	4700
DI-499	1454	EREX, Inc.	P-481	Haysi	9900'S. 37°12'30"	10080'W. 82°15'00"	Dev.	4750	Chattanooga Sh	Berea Ss	21	622
DI-505	1468	Edwards & Harding	EH-26	Haysi	2010'S. 37°15'00"	11980'W. 82°17'30"	Exp.	4446	Chattanooga Sh	Berea Ss, Greenbrier Ls	0	582
DI-510	1475	Edwards & Harding	EH-23	Haysi	5480'S. 37°12'30"	10700'W. 82°15'00"	Dev.	4553	Chattanooga Sh	Berea Ss, Greenbrier Ls	0	1905, 133
DI-313	933	EREX, Inc.	P-316C	Nora	13225'S. 37°02'30"	10160'W. 82°15'00"	Exp.	2859	Bluestone	Pocahontas, Lee	60	23
DI-363	1011	EREX, Inc.	P-386C	Nora	3700'S. 37°07'30"	1470'W. 82°20'00"	Exp.	2172	Bluestone	Pocahontas, Lee	30	25

File Number	Permit Number	Operator	Well Name	7.5-minute Quadrangle	Latitude	Longitude	Well Class	Depth (feet)	Total Formation at T.D.	Producing Formation	Initial Flow (Mcfd)	Final Flow (Mcfd)
DI-374	1027	EREX, Inc.	P-416C	Nora	6425'S. 37°05'00"	675'W. 82°20'00"	Dev.	2536	Bluestone	Pocahontas, Lee	49	88
DI-380	1035	EREX, Inc.	P-402C	Nora	14140'S. 37°07'30"	5180'W. 82°20'00"	Dev.	2406	Bluestone	Pocahontas, Lee	0	142
DI-381	1036	EREX, Inc.	P-419C	Nora	12185'S. 37°05'00"	11340'W. 82°20'00"	Dev.	2731	Bluestone	Pocahontas, Lee	73	60
DI-393	1070	EREX, Inc.	P-432C	Nora	9800'S. 37°05'00"	990'W. 82°20'00"	Dev.	2313	Bluestone	Pocahontas, Lee	60	60
DI-399	1088	EREX, Inc.	P-431C	Nora	11880'S. 37°05'00"	11810'W. 82°17'30"	Exp.	2560	Bluestone	Pocahontas, Lee	21	12
DI-457	1290	EREX, Inc.	PC-112	Nora	9600'S. 37°05'00"	1020'W. 82°15'00"	Dev.	2789	Bluestone	Pocahontas, Lee	11	60
DI-462	1322	EREX, Inc.	PC-124	Nora	7920'S. 37°05'00"	8620'W. 82°15'00"	Dev.	2212	Bluestone	Pocahontas, Lee	103	84
DI-463	1323	EREX, Inc.	PC-126	Nora	6280'S. 37°05'00"	7080'W. 82°15'00"	Dev.	2216	Bluestone	Pocahontas, Lee	21	60
DI-467	1334	EREX, Inc.	PC-113	Nora	4380'S. 37°05'00"	2000'W. 82°15'00"	Dev.	2300	Bluestone	Pocahontas, Lee	103	115
DI-468	1335	EREX, Inc.	PC-116	Nora	9400'S. 37°05'00"	7420'W. 82°15'00"	Dev.	2445	Bluestone	Pocahontas, Lee	198	103
DI-473	1349	EREX, Inc.	PC-123	Nora	10700'S. 37°05'00"	8650'W. 82°15'00"	Dev.	2622	Bluestone	Pocahontas, Lee	25	110
DI-474	1350	EREX, Inc.	PC-134	Nora	2450'S. 37°05'00"	2000'W. 82°15'00"	Dev.	2358	Bluestone	Pocahontas, Lee	0	4
DI-511	1476	EREX, Inc.	PC-012	Nora	14280'S. 37°05'00"	10020'W. 82°20'00"	Dev.	1969	Bluestone	Pocahontas, Lee	21	8
DI-512	1477	EREX, Inc.	PC-147	Nora	12250'S. 37°05'00"	10000'W. 82°15'00"	Dev.	2330	Bluestone	Pocahontas, Lee	215	326
DI-513	1478	EREX, Inc.	PC-149	Nora	11480'S. 37°05'00"	11600'W. 82°15'00"	Dev.	2680	Bluestone	Pocahontas, Lee		
DI-514	1479	EREX, Inc.	PC-153	Nora	2720'S. 37°05'00"	4350'W. 82°15'00"	Dev.	2271	Bluestone	Pocahontas, Lee		
DI-515	1480	EREX, Inc.	PC-154	Nora	3520'S. 37°05'00"	650'W. 82°15'00"	Dev.	2588	Bluestone	Pocahontas, Lee		
DI-518	1483	EREX, Inc.	PC-146	Nora	9300'S. 37°05'00"	1210'W. 82°15'00"	Dev.	2274	Bluestone	Pocahontas, Lee	15	34
DI-519	1484	EREX, Inc.	PC-150	Nora	4900'S. 37°05'00"	8380'W. 82°15'00"	Dev.	2209	Bluestone	Pocahontas, Lee		
DI-277	885	EREX, Inc.	P-228	Prater	8275'S. 37°10'00"	5210'W. 82°12'30"	Dev.	3235	Hinton Formation	Ravenciff	158	660
DI-295	906	EREX, Inc.	P-234	Prater	3420'S. 37°10'00"	9750'W. 82°12'30"	Dev.	4907	Chattanooga Sh	Berea Ss, Ravenciff	696	267, 1143
DI-297	908	EREX, Inc.	P-284C	Prater	7850'S. 37°10'00"	7475'W. 82°12'30"	Dev.	2391	Hinton	Ravenciff		
Russell County												
RU-008	1392	EREX, Inc.	PC-301	Duty	2680'S. 37°02'30"	6650'W. 82°07'30"	Dev.	2414	Bluestone	Pocahontas, Lee	103	200
RU-009	1393	EREX, Inc.	PC-304	Duty	14600'S. 37°05'00"	3220'W. 82°07'30"	Dev.	2280	Bluestone	Pocahontas, Lee		
Tazewell County												
TA-039	1365	CNG Development Company	3564	Bramwell	3650'S. 37°20'00"	6000'W. 81°20'00"	Dev.	4975	Chattanooga Sh	Price	0	730
Wise County												
WS-237	1073	EREX, Inc.	P-437C	Caney Ridge	12175'S. 37°02'30"	10710'W. 82°27'30"	Exp.	2678	Bluestone	Pocahontas, Lee		
WS-225	1006	EREX, Inc.	P-389C	Coeburn	8000'S. 37°00'00"	6950'W. 82°27'30"	Exp.	2831	Bluestone	Pocahontas, Lee	15	7
WS-248	1103	ANR Production Company	10909	Coeburn	13950'S. 36°57'30"	9500'W. 82°27'30"	Dev.	5388	Chattanooga Sh	Chattanooga Sh, Berea Ss	0	133
WS-250	1109	ANR Production Company	10959	Coeburn	8325'S. 36°55'00"	3825'W. 82°27'30"	Dev.	5424	Chattanooga Sh	Chattanooga Sh, Berea Ss	0	696
WS-266	1174	ANR Production Company	10927	Coeburn	2150'S. 36°55'00"	9300'W. 82°27'30"	Dev.	5382	Chattanooga Sh	Chattanooga Sh, Greenbrier Ls	0	409
WS-270	1181	EREX, Inc.	P-342	Coeburn	5150'S. 36°57'30"	4830'W. 82°25'00"	Dev.	5323	Chattanooga Sh	Berea Ss, Greenbrier Ls	413	2768
WS-291	1354	ANR Production Company	W7 #2	Coeburn	2511'S. 36°57'30"	9991'W. 82°22'30"	Dev.	6057	Chattanooga Sh	Berea Ss	0	823
WS-295	1364	ANR Production Company	W7 #13	Coeburn	4764'S. 36°57'30"	786'W. 82°25'00"	Dev.	6896	Chattanooga Sh	Berea Ss	0	169
WS-287	1299	ANR Production Company	Q5 #6	Flat Gap	12850'S. 37°02'30"	11200'W. 82°37'30"	Dev.	5718	Chattanooga Sh	Chattanooga Sh, Price	0	852, 660
WS-296	1380	ANR Production Company	P3 #1	Flat Gap	12535'S. 37°07'30"	4735'W. 82°40'00"	Exp.	5288	Rose Hill	Chattanooga Sh	0	198
WS-239	1075	ANR Production Company	10103	Wise	10700'S. 37°00'00"	12125'W. 82°35'00"	Dev.	5900	Chattanooga Sh	Chattanooga Sh, Price	0	327